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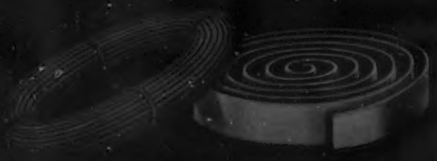

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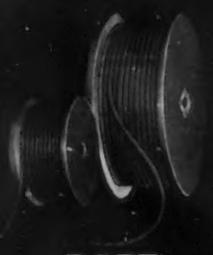

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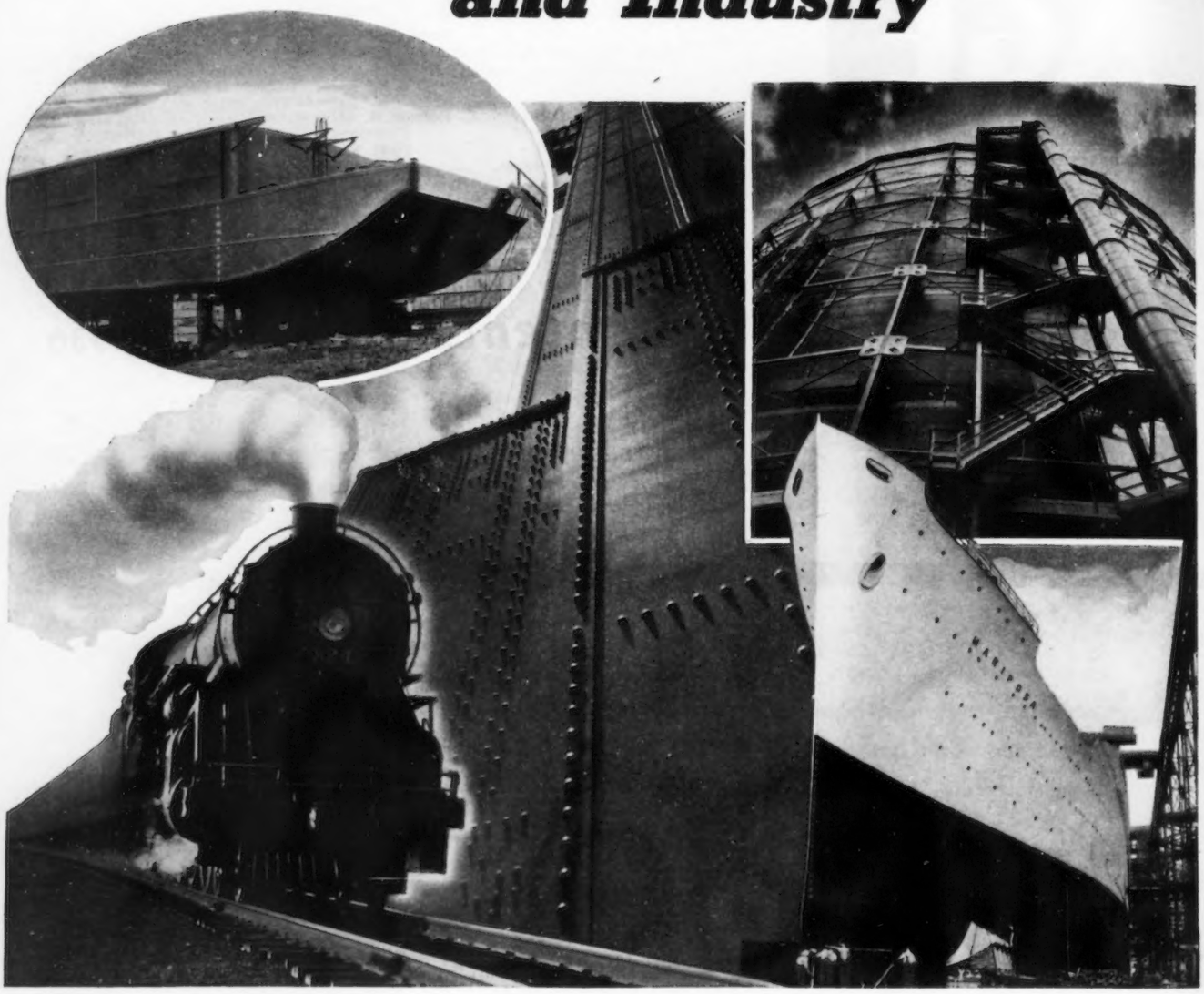

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DECEMBER 31, 1936

ESTABLISHED 1855 Vol. 138, No. 27

Be It Resolved—

THERE is something fascinating about plain white paper.

We could show you great rolls of it, for example, in the stock room of our printing plant. There it lies, quiet and meaningless except as paper, but full of potential power for useful service. Something like the still waters above the power plant dam which in time will become electric current and do work for people.

Week by week, next year, that paper will be transformed into a record of accomplishment in the metal-working industry. What it will be, no one can foretell. There will be announcements, undoubtedly, of many forward steps in technical progress; there will be important developments in employer-employee relations. As the plain white paper gradually becomes transformed into history and information, we shall know how far the forward steps are outdistancing the backward ones whether 1937 is to become what we hope it will be—a year of outstanding progress.

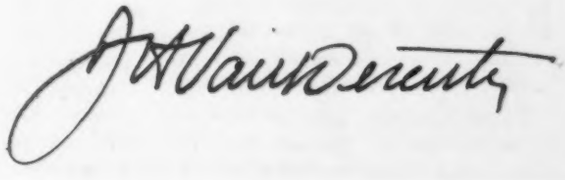
Here is something for you to think about in this connection. The record that will be written on those great rolls of plain white paper is not composed by editors or printers, it is written by the industry. And every man in the industry, be he laborer or president, "takes his pen in hand" to help write that record. When you think of it in that way, it comes home to each one of us. I do not think that any man in our industry would knowingly put a mark on that white paper that would record a step backward instead of a step forward.

Nineteen thirty-seven may be a critical year for all of us, in domestic as well as world affairs. Each one of us, then, should strive more than ever to do his best to make that white paper unwind a record of real progress.

Let us all strive as never before to fill this record with good will toward our fellow men. If we are in positions of authority, let us try to make 1937 a peaceful and happy year for those who come under our direction.

And let us all try to make it a prosperous year; one that will bring a better living for everyone, more opportunity for men to work and earn.

Be is resolved that each and every one of us will do our utmost to make 1937 the best year yet for the metal-working industry and for America.



THE ECONOMICS OF INDUSTRIAL POWER TRANSMISSION

How Many Machines to Each Motor?

By FRANCIS JURASCHEK
Consulting Editor, The Iron Age

SUMMARIZING the two discussions heretofore published on the economics of industrial power transmission, in the issues of Nov. 19 and Dec. 17, this article states succinctly the advantages and limitations of the two present systems of driving industrial machinery—individual motor drive and modern group drive — and clears the ground for the detailed presentations of the applicability of various types of power transmission equipment.

IN the first paper of this series it was stated that the real question involved in designing a system of industrial power transmission today comes down to this question, how many machines shall be driven from one motor? This is the basis of the economic arguments on the subject, for fully 99 per cent of all industrial machinery is now driven, directly or indirectly, by electric motors.

In debating this question we may leave out of the picture for the time being those machines which are driven by more than one motor, such as certain complicated machine tools with multiple motions at different speeds, and consider only those machines which may be operated one motor to one machine (individual motor drive) or one motor to many machines (modern group drive). Likewise we may eliminate *all* consideration of old-fashioned lineshaft drives, on the assumption, concurred in almost universally, that such drives are anachronisms today, and should be replaced as quickly as possible for both economic and engineering reasons by one or the other of the modern transmission systems.

The slogan "Do It Electrically" has been somewhat overworked in recent years, with the result that industrial users of motors have made many applications of small motors which have not been warranted economically. But it is not correct to impugn the reliability of small motors, for they have won an enviable place as a faithful and thoroughly useful servant of industry. There are many situations in which they cannot be replaced as the most efficient and economical means of applying power to machinery. There are also situations in which they should never be considered. The following analysis is an attempt to indicate, first, where individual motor drive, whether it be with large or small motors, is the only type of drive to consider; second, in certain borderline cases where either method is possible, why individual motor drive is to be preferred over

modern group drive; third, to indicate the great middle ground where individual motor drive and modern group drive really compete; and fourth, the types of conditions under which modern group drive is best.

At the same time, it should be borne in mind that "circumstances alter cases" and hard and fast rules cannot be laid down. The best theoretical considerations may be upset by a given set of conditions. Every application must be studied on its own merits, from the combined standpoints of type of service, operating characteristics of the machine, first cost, operating cost and maintenance cost of the transmission equipment, production flow, motion economy, materials handling requirements, safety, lighting and general working conditions. With these mental reservations the problem may be approached as follows:

Individual Drives

Certain considerations indicate conclusively individual motor drive as meeting in the only practical manner particular requirements of the machines to be driven.

1. All machines which are in themselves movable, such as hoists, cranes, industrial trucks, and portable power tools of all descriptions. Manifestly it would not be possible to group-drive such equipment. (It should be noted that many of these machines may be, and are, driven by other means than electric motors, but electric motors are preferred in most cases.) When speaking of portable power tools, one's mind naturally turns to the electric drill and similar pieces of small hand equipment. But a portable power tool today may mean a machine weighing several tons. In Fig. 1 several such pieces of equipment are shown, working in the shops of the Westinghouse Electric & Mfg. Co. on a 32 ft. valve for Boulder Dam. The work is too large to take to stationary machine tools, so it is mounted on a revolving table and the machine tools are brought to the work, set up and held in position by bolts passing through the T-slots in the floor plates. The tools are post mills and, in the background a radial drill; all, of necessity, individually motor driven.

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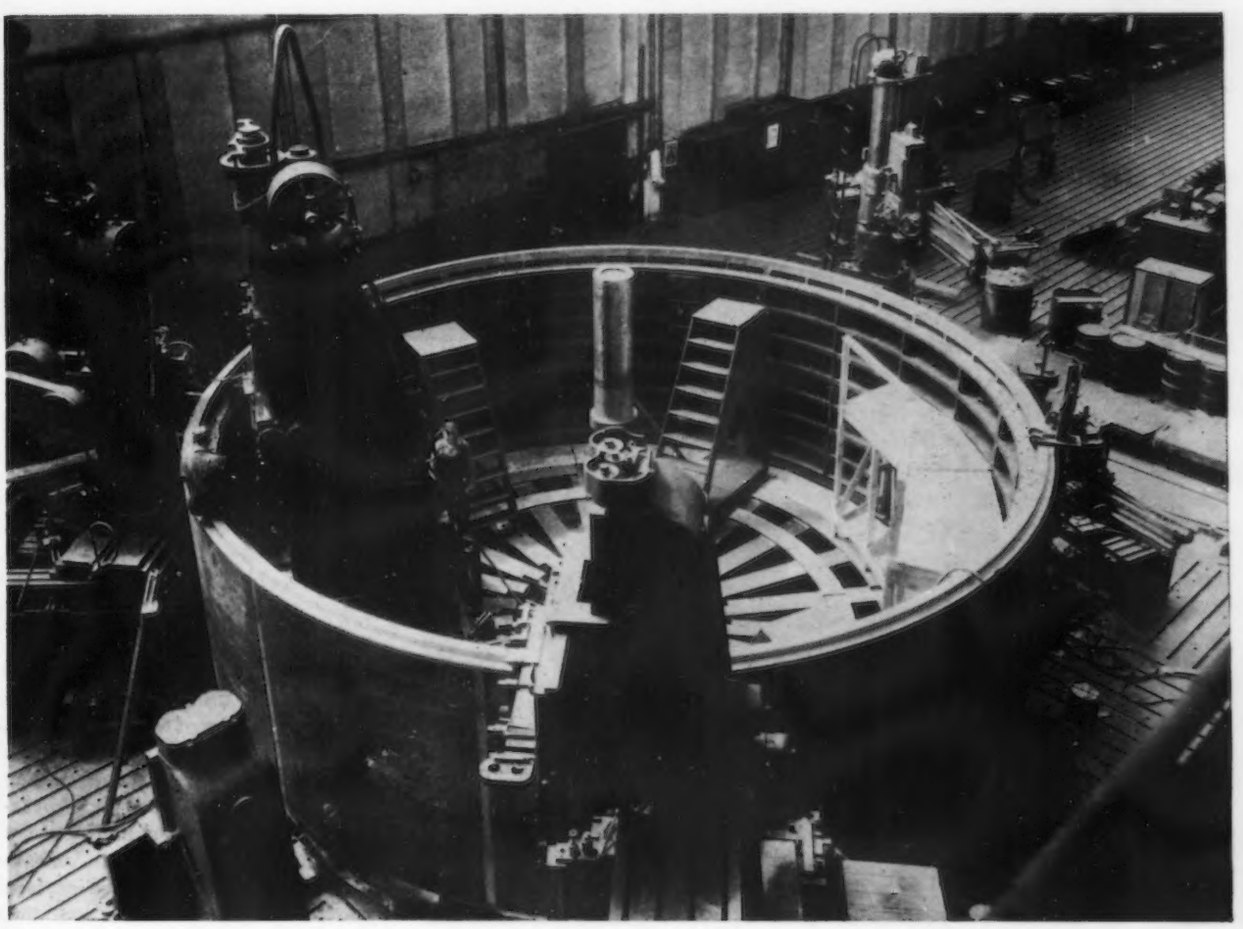
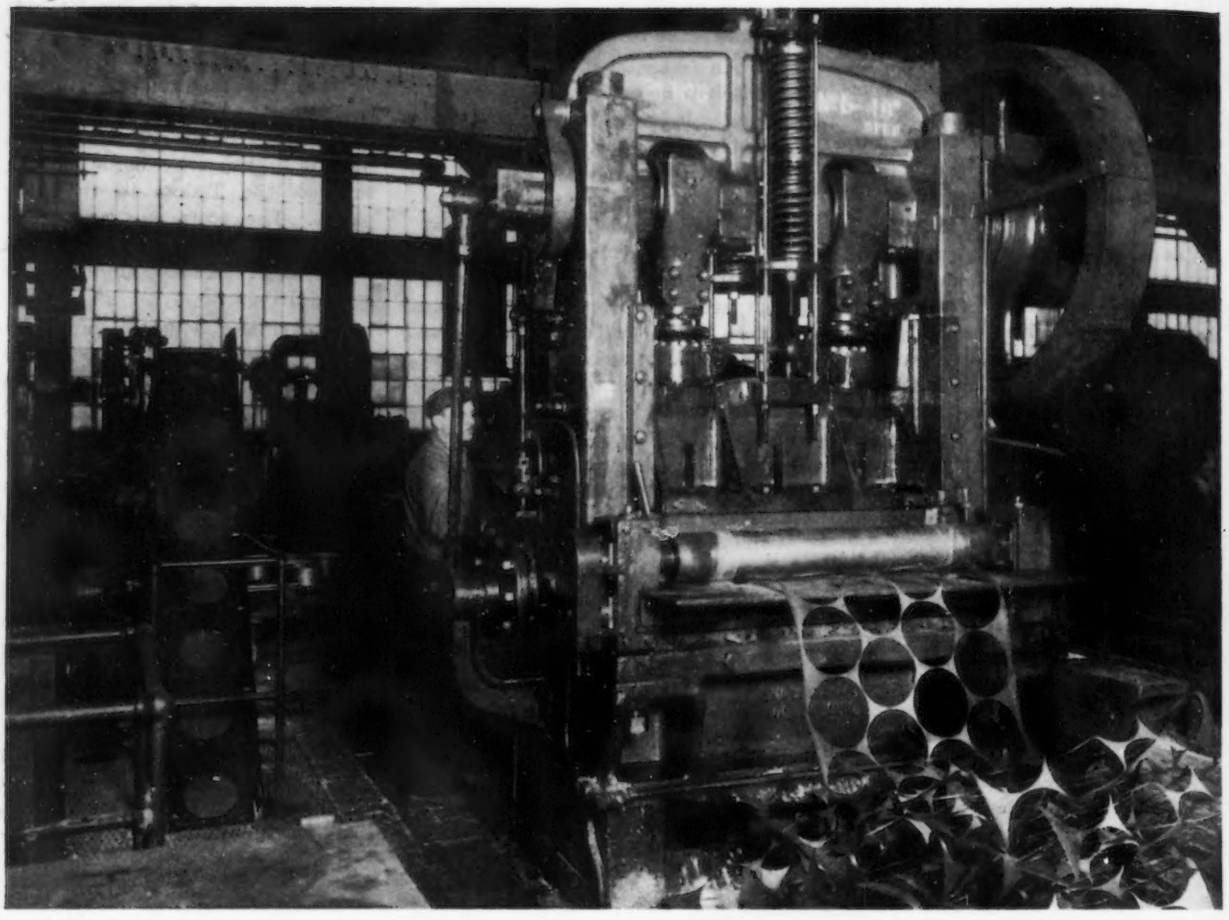
FIG. 1—Portable tools cannot be group-driven. This 32 ft. valve section for Boulder Dam was work too large to be taken to stationary machines, so portable "tools" (post mills and a radial drill) were taken to the work in the Westinghouse Electric & Mfg. Co. shops.

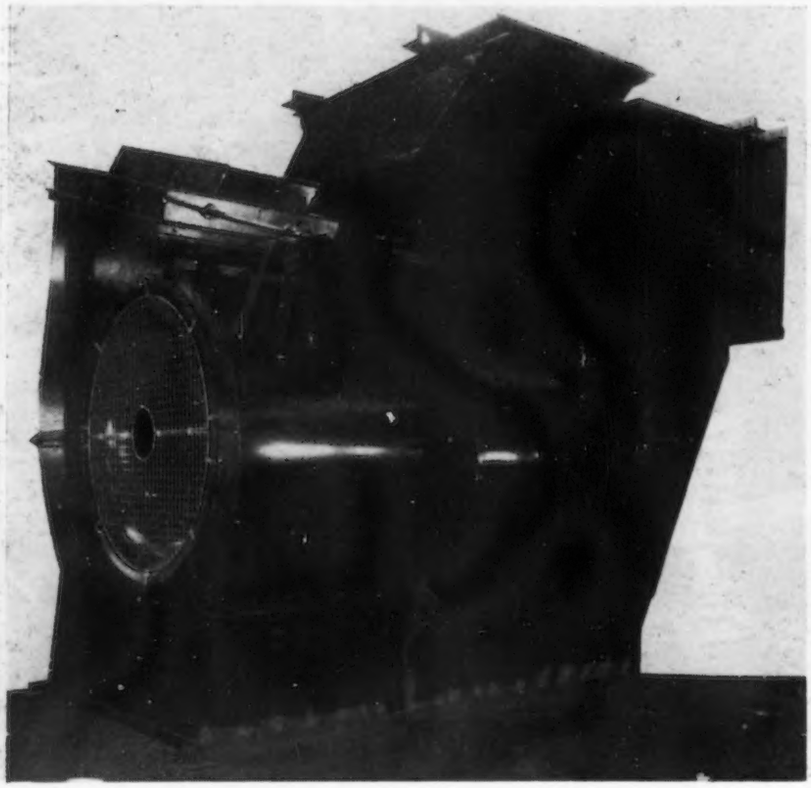
2. Machines which require extremely large applications of power in comparison with other machines located nearby; such as heavy metal stamping and forming presses (see Fig. 2), blooming mills or strip rolling mills, high duty suction or blower fans (see Fig. 3), large air or ammonia compressors, large reciprocating, centrifugal or rotary pumps, cement kilns and certain types of special production machine tools, as broaches, milling cutters and planers. It should be noted as a possible exception, however, that where several similar pieces of equipment operate on similar time schedules all within very short distances of each other, it is possible and may prove de-





ABOVE

FIG. 2—THIS blanking press stamping out motor laminations at Westinghouse is a "rugged individualist" so far as the drive problem is concerned, and hence is a fitting subject for individual motor drive.



AT LEFT

FIG. 3—This new Sturtevant Duplex fan installed at Virginia Light & Power Co. is a perfectly balanced combination of induced draft and forced draft wheels mounted on a common shaft. A single, constant speed motor drives both wheels simultaneously. The controls are so sensitive that only individual drive will meet the power transmission problem.

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sirable to group them into a single motor driven unit, even though the power demands of each are high. It is not possible to say what the limit in size of a single group drive motor may be, though practical considerations of maintenance and interruptions due to breakdown will tend to impose certain limitations.

3. Machines which have highly individual operating characteristics in comparison with other machines located nearby, such as a circular saw, a squaring shear, a conveyor, a hydraulic baling-press, or a ventilating fan. The "highly individual operating characteristic" may be high speed, as in a centrifugal pump, or low speed, as in a conveyor (although extreme speed step-ups or step-downs may be efficiently produced by gear-sets, or variable speeds by variable speed transmissions connected to constant speed power sources); or widely fluctuating loads, as in a metal planer; or varying time cycles of operation, as in an elevator; or continual reversals of motion, as in a laundry drum; or intermittent starting and stopping, as in a shear.

Among some of the special cases coming within this category may also be listed machines which are difficult to start, as a tube mill in a cement plant, loaded with freshly calcined material and the grinding balls; a machine which requires finely graded adjustable speeds, as a step-turning lathe; machines which require frequent stopping under severe conditions, entailing dynamic braking, regenerative motor operation, or "plugging," such as a mine hoist; and machines which require rapid acceleration from a heavily loaded start at frequent intervals, such as a sugar centrifugal.

The point to be emphasized here is that the machine which is always or usually, for one reason or another, out of step with the rest of the procession should be put in a class by itself and driven individually.

4. Machines which are isolated; that is, situated in such locations that they cannot be readily grouped with other machines because of the extreme lengths of shafting required for mechanical interconnection. As a special case within this category should be listed two or more machines, or parts of one operation, located at points some distance apart, but requiring synchronous operation; such as the cement kiln and the slurry feed in a cement mill.

5. Machines which require elaborate or complicated control of individual operations, or for which remote control is considered desirable. In the first instance the modern multiple operation turret lathe may be cited as an illustration; in the second a pump filling a water storage tank.

The illustrations mentioned above should be considered merely as typical. The operating characteristics in each case may well apply to many other types of machines with similar characteristics.

Eliminating the types of machines noted in the five classes above as, under almost all conditions, best served by individual motor drive, there remains a very large proportion of all industrial equipment which, by reason of service conditions or operating requirements, is usually found grouped in the average industrial plant under either of two classifications:

A. Batteries of similar machines, such as automatic screw machines, grinders, knitting machines, weav-

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FIG. 4—"Before." A view taken in one of the Westinghouse machine shops several years ago when old-fashioned lineshaft drive was considered quite correct. Lighting and safety conditions were poor.

ing looms, band saws and mixing kettles.

B. Combinations of dissimilar machines engaged in progressive manufacturing operations on one piece of work, such as a lathe, a broach, a grinder and a drill press in a metal working plant, or a band-saw, a surfacer, a lathe and a mortising machine in a wood-working mill.

Here is the great middle ground where individual motor drive and modern group drive both apply. In considering the economics of the application of either system, the factors of investment cost, operating cost, maintenance cost, service conditions, machine operating characteristics, production flow and motion economy must be analyzed for both cases.

However, in this great middle ground there are certain points which tip the scale in favor of individual motor drive, aside from these considerations. These should be carefully noted and weighed in the balance against such advantages as the modern group drive method offers. They may be stated as follows:

I. In that group of machines in which the loads on each are fairly constant and well over 60 per cent of full load, and where the starting load is not greatly in excess of the normal running load (sewing machines in a garment factory provide a good example) modern group drive does not present any particular operating advantage, and individual motor drive methods may easily have the preference for reasons of close production control. In brief, for any production unit of machines, unless the load characteristics of the machines indicate the possibility of using considerably less installed horsepower to drive them by group methods than by individual motors, the superior economy of group drive is not clearly apparent, in spite of the lower investment cost and consequently lower fixed charges.

II. In a plant where a great deal of overtime work is done, involving the use of a few machines only in each production group, unless these machines can be logically segregated into special groups and operated as group units, individual motor drive is preferable for the overtime periods of work, and may counterbalance the advantages gained by group operation during normal working periods.

III. Where the combination of several machines in a logical production unit would make it necessary to provide a very large group drive motor, practical considerations of motor maintenance or of interruptions to service caused by motor breakdown may make individual motor drive preferable. Usually, overhead mounted group motors are seldom installed over 50 to 75 horsepower, and floor mounted group drive motors seldom exceed 100 horsepower.

All the real and possible exceptions to the feasibility of using modern group drive methods noted heretofore make up somewhat more than one-third of all the industrial machinery now in use in the United States. From the remaining equipment reasons of expediency may dictate the subtraction of those machine tools, wood-working tools, miscellaneous types of chemical engineering equipment and certain kinds of special production machinery into which the manufacturers of the tools and equipment have built individual motor drives, leaving the purchaser practically no choice in the matter when he installs them in his plant. Allowing for such deductions, the net remainder is somewhat more than 50 per cent of the equipment at present operating. A very small part of this is now being driven by individual motor drive at too great a cost and at too low a power factor. Most of it is still being driven by the wasteful,

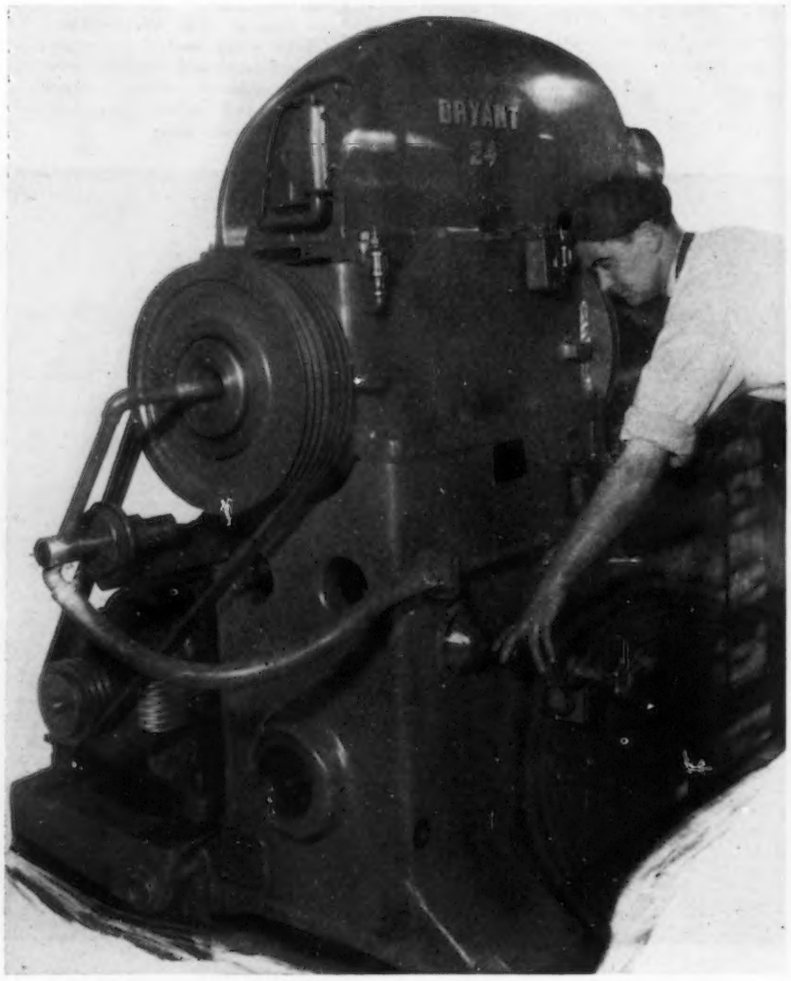

FIG. 6—WHERE finely graduated speed control is required in a machine tool, the individual motor drive with a variable speed transmission unit is ideal. Speed changes are made with ease by means of a Graham transmission.

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power-consuming, friction-building old-fashioned lineshaft drives which our great-grandfathers installed, and which we have improved only in the matter of technical equipment. Some of this lineshaft driven machinery ought logically to be individually motor driven; most of it would amply repay the cost of modern group drive installation; all of it must be modernized sooner or later. And it is right here that the real opportunity exists to cut production costs.

Individual vs. Group Drive

In the middle ground where individual motor drive and modern group drive really compete, the advantages and limitations of each method must be carefully studied, not as abstract theoretical considerations, but as practical applications to the particular plant, or department, or section of a department in question.

FIG. 5—"After." View in a similar Westinghouse shop following completion of an extensive modernization program. Note the marked improvement in general working conditions.

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A great deal of stress has been laid on the lower investment cost and fixed charges of modern group drive installations. These lower first costs are very real where compact groups of machines operate continuously or simultaneously, and where, in such groups, the diversity factor of operation of the several machines is such as to permit of them all being driven by a single motor of much smaller rating than the combined capacities of all the motors required for individual motor drive. Included within these savings is the difference in cost of one control and one set of wiring as against a number of controls and their wiring requirements. This factor is usually offset, however, by the increased cost of mechanical transmission equipment required with modern group drive.

Operating costs are in favor of modern group drive when the driven machines are compactly arranged, the mechanical transmission as efficient as can be obtained, and the entire drive designed so as to keep the total load constantly at or near the rated load of the motor. This operating economy breaks down, however, where many machines operate intermittently or at infrequent intervals, where long lines of shafting are necessary to reach separated machines, or where much overtime work, involving the use of only a few machines, is carried on.

Maintenance costs do not vary greatly today as between either method of drive, where the drives are well designed, intelligently installed, and inspected at frequent intervals. There are records in the General Electric Co. files of large mills operating 3000 to 4000 motors, with a yearly expenditure for maintenance, including repairs, lubricating oil and inspection, of not over three cents per motor, average. And, certainly, modern mechanical transmission equipment, with shafts mounted in antifriction bearings and belts of high quality, shows maintenance costs that are comparable.

Production costs may be affected favorably by either system. Closer speed regulation of each machine is claimed for individual motor drive, yet it has been shown that for many applications modern group drive gives steadier speed, hence permits the utilization of maximum machine speeds with increased production and improved quality of production. Individual motor drive makes for less wholesale interruptions from breakdowns, but the larger group drive motors are generally more reliable and therefore cause less breakdowns. Individual motor drive permits remote electrical control of machine operations, leaving the operator free to observe his work, but remote control is now being similarly adapted for group drive operation. The former speed control advantages of individual motor drive have today their counterparts in special mechanical transmission equipment in the group drive system.

Machine location and relocation is very flexible with individual motor drive, but with group drive shafts hung from rectangular stringer systems, or mounted on the floor, below the floor or in back of a row of machines, a large degree of flexibility is made available to the group drive system. Such placement of shafting likewise counters many of the arguments formerly advanced by individual motor drive proponents in the matter of lighting, safety and general working conditions. And materials handling systems may be planned and installed in conjunction with modern group drive setups practically as easily as with individual motor drives. All these factors must be weighed pro and con in connection with the conditions of the actual case being studied.

In Figs. 4 and 5 are shown the visible effects of a typical shop

(CONTINUED ON PAGE 39)

RANDOM THOUGHTS of an IDLE STEEL MAN

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By FRANK H. CROCKARD

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IN the second section of this article published last week, the author listed a number of practices which conceivably could cheapen and simplify operations in the steel mill of the future. In this, the third and last section of the article, the discussion of coke ovens is continued, and mention is made of possible changes in blooming mill, bessemer, and open-hearth practice.

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AMMONIA sulphate recovered as a by-product from coke oven gas contributed a very important credit during the earlier years of the by-product oven. Today the world productive capacity is greatly in excess of consumptive demands of industrial nitrogen. In consideration of this situation and other important factors relating to ammonia sulphate as a fertilizer, it would seem highly desirable to find through research a method of fixing ammonia in a form carrying a higher ammonia content, in which form it would remain stable and non-hygroscopic when mixed with finely ground basic blast furnace slag. The substitution of ground slag as a filler instead of the inerts sometimes used would in many cases permit the filler to act as a volunteer fertilizer, performing a useful function in soil improvement. The use of inerts imposes freight costs and labor charges in distribution which return no benefit. It is fully realized that the use of slag in this manner would not be a panacea; rather it is suggested as a material which could return a credit through better utilization of a material frequently wasted. In the case of acid soils or those bordering on sourness it would be very beneficial.

Sulphur in coke can be, and in many cases is, reduced by washing the coal before coking in those cases where the sulphur exists as free pyrite or marcasite and not largely as organic sulphur. After such beneficiation, however, the sulphur content of the coke is still comparatively high. Further marked reduction is highly desirable because of its great metallurgical advantage. That such results may be obtained as a post coking operation is a known technical fact.

Dr. G. E. Foxwell (*Gas Journal*, Jan. 1, 1936) states that in experiments using a stream of steam for a 4-hr. period at a temperature of 800 deg. C., the sulphur removal was 84 per cent of the sulphur content of the coke. Using hydrogen for a like period at 1000 deg. C., the coke lost 87 per cent of its sulphur. Smaller but important reductions were obtained when using coke oven gas.

The problem therefore is one of developing a commercially practicable process, the metallurgical importance of which is evident. The economic significance of such a development is perhaps even greater.

Large tracts of coal are not now metallurgically available because of their higher sulphur content. The availability of a desulphurizing process in connection with the more favorable geographic location of such coals would make them competitive with those more remotely located, greatly increasing the reserves of metallurgical fuels and most significantly affecting costs.

The blooming mill with its accessories represents an important capital investment. The principal

operating costs embracing labor, power and fuel constitute an important item of total steel production costs, which are further increased by unavoidable scrap losses.

The material upon which the mill operates is the ingot. Here for a number of reasons known to the industry, may be developed conditions seriously affecting the finished product. These conditions may develop in the mold, in the soaking pit, in the rolls, or the accumulated evils of all three sources may be exhibited.

Viewed as a method of converting molten steel into the solid form the blooming mill represents a very expensive and somewhat complex process.

The direct transference of liquid steel into a rolled product would eliminate many technical difficulties, greatly reduce capital investment and decrease costs. The recent experiments of the German, Hans Bleckmann, seem very promising, as is also the work of French investigators. [Ed. Note: Experiments abroad have been on a laboratory scale generally using small hand-turned rolls, whereas in this country large mills have successfully rolled high-grade steel in small lots, both in the "Norton" unit back in 1891 and, more recently, in the Hazelett mill.] Actual experiments indicated the possibility of extracting heat from overheated liquid steel in a manner producing proper solidification between two internally water sprayed rolls, [Ed. Note: In this country internal cooling is considered dangerous; for a cracked roll may result in a severe explosion.] from which the steel emerged as plate material say, 20 in. wide and 0.8 in. thick. After cooling to proper rolling temperature, the material is worked up in ordinary rolling mills.

The problem is of such vast economic importance that it seems worth rating as a major project of intensive research. Its solution would greatly reduce the production costs of light plates, skelp, sheets and strip which of themselves represent a very important percentage of total rolled products. It is quite probable, however, that the development of an extrusion process would directly or indirectly affect other groups of finished steel. Oval bars would probably be available, some of which would be finished as standard bars, while an important tonnage would be available as rod material for the production of wire. Structural mill products would be displaced to the extent represented by their replacement with forms produced by continuous cold forming mills using strip material derived from extruded plates. The aggregate tonnage affected would probably represent 50 to 55 per cent of all rolled products.

Obviously, the savings through decreased labor, fuel, power and scrap losses would be correspondingly great.

During the early history of bessemer steel it was used for many purposes. Its importance declined with the growing scarcity of bessemer ores, the increasing availability of scrap and the trade demand for a lower phosphorus steel, based upon the belief that brittleness and decreased ductility are directly proportional to the phosphorus content, where as such effects are a function of the carbon content. This supposition was not discouraged by those making only open-hearth steel.

Dr. Howe as early as 1890 stated that in the case of soft steels the effect of phosphorus on ductility as occurring in bessemer steel may be very slight and of no practical value. It is probable that the bessemer process may continue to maintain an important position if, indeed, it does not enjoy a renaissance.

Capital investment per ton of steel produced is much lower with the bessemer than with the open hearth.

The bessemer is admirably adapted to the production of low carbon steel. Some of the distinguishing characteristics of bessemer steel are, greater stiffness and higher tensile strength with a given carbon content, as compared with open-hearth steel. Higher weldability qualities, easy machineability, free cutting as exemplified in screw and bolt stock, and greater wear resisting qualities as in cold-rolled shafting. Adaptability in the production of wire and lap or butt weld pipe are well recognized.

In addition to these qualities, comprehensive corrosion tests point strongly to the superiority of bessemer copper-bearing alloy. These and other quality considerations indicate the importance of bessemer steel for special uses. Flexibility of production is an outstanding advantage, either with reference to monthly production, or the readily variable converter charge required in meeting mill schedules of wide chemistry variation and small tonnage. An increased percentage of bessemer production would also decrease soaking pit costs.

The matter of increasing bessemer steel output without increasing the bessemer ore requirements for the production of additional bessemer iron, offers an attractive problem.

The utilization of mill scrap by the open hearth has long been accepted as the conventional method of disposition. Here is a superb raw material very low in phosphorus and sulphur content, and carrying an appreciable amount of manganese. To deliberately contaminate such desirable raw material with the high phosphorus of the blast furnace pig iron under all market conditions seems somewhat questionable, especially when measured in terms of *net* commercial results. The use of low phosphorus mill scrap as a 100 per cent burden at the blast furnace with only such minimum ore additions as may be necessary to regulate manganese content and slag volume is suggested. The production of a blast furnace operating on such a charge would be about double that of its nominal capacity when using an all-ore burden. The iron so produced would be a very high quality bessemer, since the phosphorus content would be substantially less than that of bessemer iron as now produced.

With quality iron available for bessemer use, it would then be desirable to establish and maintain the most regular and uniform operating conditions. This could in part be accomplished by the use of a dry blast, by which variations in moisture content would be regulated, thus bringing temperature control within narrowed limits.

The use of an oxygen-enriched blast when commercially available will decrease the amount of nitrogen blown, permitting a reduction of silicon in the iron with corresponding fuel savings at the blast furnace. The use of the turbo blower would be helpful in more accurately regulating blast pressure and volume, highly important factors during the turn down

period. Ladle additions from the electric furnace could be made in the liquid condition, assisting in more rapid reactions and greater ingot homogeneity. Such a procedure would offer inviting possibilities in the further exploration of the bessemer alloy field, which has been more particularly limited to the open hearth and electric furnace.

Throughout the life of the bessemer process the heat of the converter gases has been wasted. The presence of ejecta and the intermittency of the operation make the recovery problem more difficult. Utilization in the preheating of scrap for use in the converter or in the open hearth, or in calcining limestone for use in the duplex process may be feasible points of attack.

The Open Hearth

The development of the open hearth has progressed along the usual lines of gradually increasing unit size and the refinement of accessory details which have contributed somewhat to decreased fuel charges, lowered maintenance costs and decreased man hours per ton of steel. Concurrently it has necessitated the installation of much heavier cranes and ladles, which periodically deliver greatly increased tonnages requiring relatively greater soaking pit capacity for the handling of the ingots resulting from such large heats. Temperature control during pouring has not been aided by this practice, while, at smaller plants, rolling specifications covering such large heats may not be readily available. There has been no change in the fundamental practices relating to the strictly metallurgical phases of the operation.

In the open hearth much time is spent in melting scrap and preparing the slag. The preparation, loading and charging of scrap represent an appreciable part of costs and not a negligible time element during charging. The scrap is heated and melted in a furnace which is not operating on the counter current principle and therefore relatively inefficient. The slag could be much more cheaply and quickly produced in a slag making furnace.

When both of these materials are reduced to the liquid state, the slag is permitted to float upon the surface of the metal bath, where it serves as an insulator, preventing rapid heat transference to the bath.

Oxidation occurs in a rather quiescent slag blanket, largely in the plane of metal-slag contact. Yet at the temperature prevailing, the reaction would be very sharp if the contacts of slag and metal were more intimate.

In the case of the acid bessemer, a heat is completed in 12 to 15 min., and with the basic bessemer the time is not greatly extended. In duplexing, a heat is finished in 4 hr. or less, while in the straight open hearth 8 to 10 hr. is required. These time differences, as is well known, are due to differences in rate of oxidation. In the converter it is very rapid because of the vigorous action characterising the process. In existing practice the speed of the duplex is dropped at the half-way point, while in the straight open hearth it never starts.

That great possibilities favoring increased speed are available is indicated by the results obtained at the plant of Ugine Perrin, as reported by Portevin (THE IRON AGE, Jan. 16, 1936, page 19). "It is known that this process consists in principle in a vigorous boiling of liquid steel with a suitable fluid slag. By choosing a proper slag it is possible to obtain in one operation of a few minutes' duration any degree of refinement which may be desired, i. e., desulphurization, deoxidation, etc.

"This new procedure whereby the refining time is greatly reduced marks a revolution in the manufacture of quality steel, obtainable up to now only by the prolonged operations in the open hearth or the electric furnace. The steels so produced are very uniform and the operators are able to procure at will any grain size, any extent or depth of temper and other mechanical characteristics which have been agreed upon for the gradation of a steel."

Manifestly the successful development of such a process sug-

THE homely blast furnace gains some semblance of grace in silhouette. Despite apparatus. More than likely, the next few years will witness changes in relative

many years of improvement, the blast furnace is still a most defective piece of dimensions, a revamping of bell design, possible enrichment of the blast, etc.

gests greatly decreased costs and capital investment.

Piping, segregation and blow holes will occur as long as steel is poured into ingot molds. The big-end-up hot-top ingot has minimized piping. Segregation will continue until instantaneous solidification is accomplished, obviously a difficult attainment.

In attacking the problem of blow holes, the work has been confined largely to doctoring by ladle or ingot mold additions, accompanied by the ever present inclusions.

Other possibilities relating to improvement is that of pouring in vacuo. The idea is not new, as several patents issued years ago attest attempts in this direction, both in ingot pouring and the production of castings. While improved practice has been claimed, the practice has not, so far as the writer is aware, been extensively followed. Perhaps the practical difficulties of maintaining a vacuum and the relatively high surface tension values of liquid steel may account for lack of wider development.

Casting in vacuo may not be the only available means of mechanically liberating at least a portion of the ladle gases.

An interesting research project would be that relating to the use of a centrifuge as an intermediate step between the ladle nozzle and the ingot mold. [Ed. Note: A centrifuge capable of handling 2½ tons per min. of molten metal is now in commercial operation in Belgium, at the Foundries St. Joseph at Samson. Results are very satisfactory, i e., high purification, rapid desulphurization, etc.] In the centrifugal casting of cast iron pipe copious volumes of gas are disengaged, in which the resulting cast product is free of blow holes.

The centrifugally cast steel gun barrels at Watertown Arsenal contain no visible defects in the form of blow holes or inclusions, the latter being deposited on the inner narrow free surface of the casting.

It is realized that the conditions obtaining in centrifugal castings and that of simply centrifuging the metal are not comparable. In the centrifugal casting the metal solidifies at or near the temperature at which occluded gases are liberated, and because of the very high pressure gradient the gases are forced by centrifugal pressure through the radical thickness of still liquid metal on the inner surface. Nevertheless, there is an important but indeterminate volume of segregated gases, the liberation of which could be reasonably anticipated by such a process.

Slag or inclusions would also be brought to the surface where they would continue floating. There would be a temperature drop which should assist in reducing segregation. A cleaner, denser, more homogeneous steel should result.

The possibility of attaining economies equaling those afforded by the mixer would seem to warrant the installation of an experimental unit.

The contributions of the various research groups have supplied much more fundamental data regarding metallurgical operations. Especially have they greatly aided in developing the alloy steels, which still constitute a relatively smaller part of the total production. It may be confidently assumed that their collaboration with the operating department would also result in the development of improved open hearth methods effecting more particularly the production of the high tonnage groups which would result in savings of incredible magnitude.

In this brief and somewhat discursive review of important factors affecting cost and practice in the iron and steel industry, it is realized that the list is most incomplete. It may provocatively suggest many other elements worthy of attention in any study relating to cost reduction by means of time and material savings.

Of great interest also are the opportunities afforded by the very important group of shops, where the replacement of obsolete machines by those of higher speeds and feeds would greatly reduce man hours when accompanied by proper methods of shop planning

(CONTINUED ON PAGE 39)

HOW TO WELD TWENTY-NINE METALS

By CHARLES H. JENNINGS

Engineer in Charge of Welding Research, Westinghouse Electric & Mfg. Co.

THIS is the second instalment in the series by Charles H. Jennings, in which the collected experience of the Westinghouse engineers and welding experts is set forth. The first instalment appeared in the preceding issue of The Iron Age and the third will be published in the issue of January 14, 1937.

THE production of joints in the higher carbon steels presents many problems and in most cases the results are non too satisfactory. It is often possible to complete a joint, but as a rule they do not give a good service life. This condition is clearly illustrated by the unsatisfactory results that have been obtained to date by attempting to make arc-welded rail joints.

If it is desired to make an arc-welded joint in steels containing 0.60 to 0.70 per cent carbon, it is recommended that shielded-arc electrodes be used. Bare electrodes can and have been used, but the results are not as satisfactory. For the best results, it is recommended that the parts be preheated to at least 500 deg. F. before welding and subsequently heat-treated. Heat-treating temperatures of 1350-1450 deg. F. produce the best results.

Austenitic steel electrodes are often recommended for welding the higher carbon steels. The resultant welds have good physical properties, but the fusion zone is still hard and brittle.

3½ Per Cent Nickel Steels

There are several grades of 3½ per cent nickel steels used for structural work. These grades vary principally in the percentages of carbon and manganese present. Although in the "as rolled" state these steels have a pearlitic structure, they will develop martensite in the heat effect zone. As a result, for the best weldability, the lower carbon ranges are preferred.

The analysis of two typical grades of 3½ per cent nickel steels are given in Table IX.

TABLE IX

Chemical Analysis of 3½ Per Cent Nickel Steels

	SAE-2315 Per Cent	SAE-2340 Per Cent
Carbon	0.10–0.20	0.35–0.45
Nickel	3.25–3.75	3.25–3.75
Silicon	0.15–0.30	0.15–0.30
Manganese	0.30–0.60	0.60–0.90
Sulphur	0.05	0.05
Phosphorus	0.04	0.04

Physical Properties of 3½ Per Cent Nickel Steels

	SAE-2315	SAE-2340
Yield point, lb./sq. in.	55–60,000	60–65,000
Tensile strength, lb./sq. in.	80–90,000	100–110,000
Elongation, per cent in 2 in.	20–25	20–25
Reduction of area, per cent	50–55	45–50

The air-hardening properties of these steels may cause trouble from cracking. Consequently, preheating from 200 to 300 deg. F. is generally recommended. If the first pass in a weld can be made without trouble, the resultant heating caused by it will usually allow the joint to be completed without difficulty. Subsequent heat-treatment after welding is recommended to produce welded joints of the highest quality. Heat-treating temperatures of 1150 to 1200 deg. F. are recommended.

Bare type electrodes can be used on these steels with satisfactory results, but the resultant welds are low in ductility and inferior to the base metal in tensile strength. Such welds, will, however, have relatively high strength as the result of the deposited metal absorbing some of the nickel from the base metal. Welds of this type will

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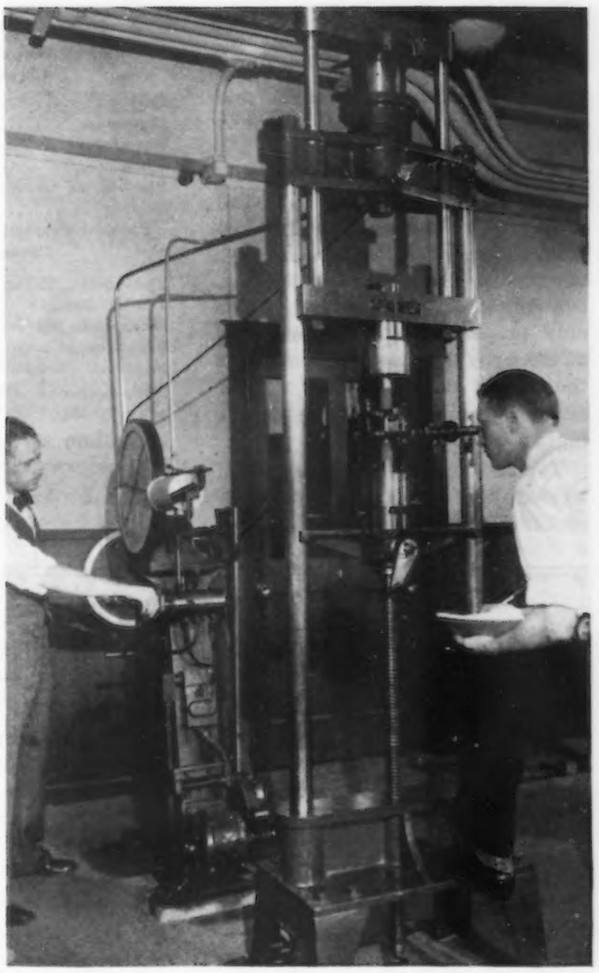

TESTING welds is an important phase of welding practice.

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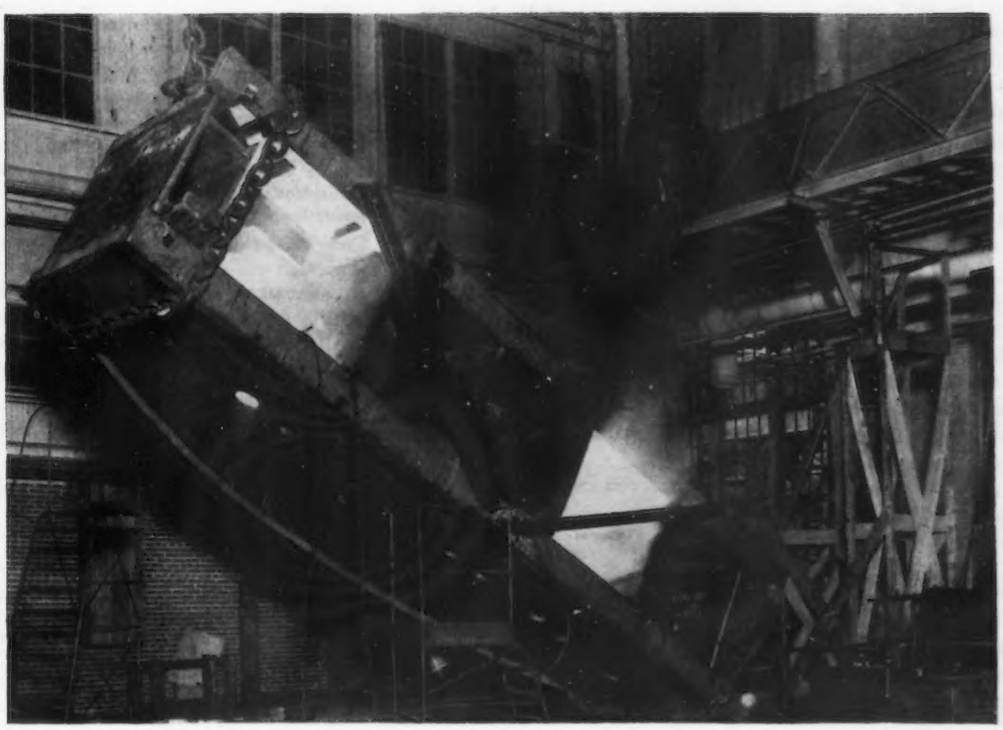

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ARC welding stiffeners to a 5 in. plate on the bed of a 2000 ton press.

o o o

pick up from 0.9 to 1.25 per cent nickel.

Shielded arc electrodes produce the most satisfactory results and several types of electrodes may be used such as low carbon, 2 and 3½ per cent nickel and molybdenum alloy electrodes. The physical properties of the welds will be dependent upon the electrode used, but almost independent of the carbon content of the base metal. The only property that is appreciably affected by the carbon content is the tensile strength which will be about 10 per cent higher for the higher carbon grade.

Typical physical properties of welded joints in the "as welded" conditions are given in Table X.

TABLE X

Physical Properties of 3½ Per Cent Nickel Steel
C, 0.10-0.20; Ni, 3.25-3.75; Si, 0.15-0.30; Mn, 0.30-0.60; P, 0.04; S, 0.05

Electrode	Yield Point Lb./Sq. In.	Tensile Strength Lb./Sq. In.	Elongation Per Cent in 2 In.	Reduction of Area Per Cent
Bare low carbon	40-45,000	60-70,000	8-10	5-10
Coated low carbon	40-45,000	75-80,000	10-15	20-25
Coated 3½ per cent Ni	45-55,000	90-95,000	15-20	18-25
Coated 2 per cent Ni	40-45,000	80-85,000	15-20	20-25
Ni, Moly.	45-50,000	80-85,000	15-20	20-25

Heat-treatment at 1150-1200 deg. F. after welding reduces the hardness of the brittle zones and makes them more machinable and ductile. It also doubles the impact strength and lowers the tensile strength about 1 to 2 per cent.

In cases where high impact resistance is required at low temperatures, it is recommended that nickel or molybdenum alloy electrodes be used. Welds made with low carbon steels have low impact strength at sub-zero temperatures, while welds made with nickel and molybdenum alloy electrodes develop impact values comparable to the base metal at such temperatures.

Steels of this grade have distinct air-hardening properties even with low carbon contents. As the carbon content increases, the air-hardening properties increase. Consequently, low carbon ranges should always be used for welding purposes. The addition of small amounts of titanium and aluminum diminish and sometimes prevent excessive air hardening. As a result, these alloys are sometimes specified in steels that are to be fabricated by welding.

The chemical analysis and physical properties of 4 to 6 per cent chromium steel are given in Table XI.

TABLE XI

Chemical Analysis of 4 to 6 Per Cent Chromium Steel

Carbon	0.05-0.15 per cent
Chromium	4.0-6.0 per cent
Manganese	0.20-0.40 per cent
Silicon	0.40 per cent max.
Phosphorus	0.03 per cent max.
Sulphur	0.03 per cent max.

Physical Properties of 4 to 6 Per Cent Chromium Steel

Yield point, lb./sq. in.	35-40,000
Tensile strength, lb./sq. in.	65-70,000
Elongation, per cent in 2 in.	35-40
Reduction of area, per cent	65-75
Hardness (Brinell)	130-140

The air-hardening properties of this alloy make it necessary to use special precautions. Preheating from 300 to 500 deg. F. is essential unless very light gages are being welded. In such cases the heat produced by welding seems to be sufficient. This preheating temperature must be maintained during welding.

Electrodes of an analysis similar to the base metal are generally recommended, although satisfactory results can be obtained with 18-8 (18 per cent chromium—8 per cent nickel) stainless steel electrodes. Welds made with the latter electrodes will contain greater ductility in the "as welded" condition, but the hard, brittle fusion zone will not be changed. The 18-8 type of electrode will be found unsatisfactory in many cases because the coefficient of expansion of such welds is much higher than that of the base metal, and because the recommended heat-treatment for 4-6 per cent chrome steels seriously affects the corrosion properties of such welds.

Reverse polarity should be used when welding this steel and the welding current and arc voltage should be somewhat lower than is required when welding plain carbon steels.

The recommended annealing process to obtain the maximum softness of the weld, and heat affected zone, consists of a full anneal at 1600 deg. F. followed by a slow furnace cool at about 50 deg. F. per hour until a temperature of 1200-1300 deg. F. is reached. From this temperature the structure may be air-cooled. Satisfactory annealing may often be obtained by prolonged heating at 1300 deg. F. followed by slow cooling. Long-time annealing at temperatures as low as 900 deg. F. followed by slow cooling have been found to produce beneficial results on welds made on this alloy.

Typical physical properties obtained on 4-6 per cent chromium steel are tabulated in Table XII.

Cromansil Steels

These steels contain various combinations of chromium, manganese, and silicon as alloying elements. The percentage of carbon present greatly influences the weldability. Consequently, it is generally recommended to use steels with carbon contents of 0.20 per cent or less for welding.

A typical analysis of Cromansil

TABLE XIII

Chemical Analysis of a Typical Cromansil Steel

Carbon	0.12-0.20 per cent
Manganese	1.1-1.4 per cent
Chromium	0.4-0.6 per cent
Silicon	0.7-0.8 per cent

Physical Properties of a Typical Cromansil Steel

Yield point, lb./sq. in.	55-60,000
Tensile strength, lb./sq. in.	80-90,000
Elongation, per cent in 2 in.	20-28
Reduction of area, per cent	50-62

TABLE XII

Physical Properties of Welds on 4-6 Per Cent Chromium Steels with Electrodes of Similar Analysis
C, 0.10; Cr, 5.21; Mn, 0.30; Si, 0.20

Treatment	Yield Point Lb./Sq. In.	Tensile Strength Lb./Sq. In.	Elongation Per Cent in 2 In.	Reduction of Area Per Cent
As Welded	60,000	90,000	10	12
Full Anneal 1600°F.	40,000	67,000	35	65

TABLE XIV

Physical Properties of Welded Cromansil Steel
C, 1.20; Mn, 1.04; Cr, .51; Si, .91

Electrode	Treatment	Yield Point Lb. Sq. In.	Tensile Strength Lb. Sq. In.	Elongation Per Cent in 2 In.
Low Carbon	As welded	45,000	78,000	24.0
Low Carbon	Annealed 1200°F.	42,000	75,000	26.0
Moly. Alloy	As welded	60,000	91,000	22.0
Moly. Alloy	Annealed 1200°F.	56,000	88,000	26.0

steel with good weldability, and the corresponding physical properties, are given in Table XIII.

Preheating of this alloy is not required if the carbon content is below approximately 0.20 per cent, although it is beneficial on large or heavy sections. With carbon contents above 0.20 per cent, preheating from 300 to 500 deg. F. is recommended. Good physical properties are obtained on welds in both the annealed and "as welded" conditions. Annealing after welding on the low carbon grades is not necessary although it is recommended for plates over 1 in. in thickness. Annealing after welding is essential for best results from the higher carbon grades.

TABLE XV

Chemical Analysis of Man-ten Steel

Carbon	0.25-0.35 per cent
Manganese	1.25-1.70 per cent
Silicon	0.15 per cent min.
Phosphorus	0.04 per cent
Sulphur	0.04 per cent

Physical Properties of Man-ten Steel

Yield point, lb. sq. in.	55-65,000
Tensile strength, lb. sq. in.	80-90,000
Elongation per cent in 2 in.	25-20
Reduction of area per cent	40-50
Endurance limit lb. sq. in.	40,000

Low carbon shielded-arc and carbon-molybdenum electrodes are generally used for welding these steels. Bare type electrodes can be used, but the results are inferior to those obtained with the shielded-arc electrodes. Although low carbon electrodes can be used, the resultant welds have a tensile strength considerably below that of the base metal.

The recommended annealing temperature to use after welding is 1150-1200 deg. F. Higher annealing temperatures may be used, but they are not essential. Higher annealing temperatures produce a greater change in the physical properties.

Typical physical properties obtained on Cromansil steel are given in Table XIV.

Man-ten Steel

Man-ten is a commercial steel containing manganese as an alloying element in combination with approximately 0.30 per cent carbon. Copper in percentages of 0.20-0.30 per cent are often added to improve the corrosion-resisting properties.

This alloy contains very good tensile properties combined with high abrasive resistance. The metallurgical characteristics resulting from the relatively high percentage of carbon are such that air hardening results from welding unless preheating is used. The degree of air hardening obtained is greatly influenced by the size of the parts being welded. Consequently, when welding thin sections, the increased hardness obtained at the fusion zone is of relatively little importance. When welding heavy sections, preheating from 300-500 deg. F. is generally recommended.

The fact that this alloy has air-hardening properties makes it desirable to take special precautions when flame cutting. Heavy sections can easily be flame cut without danger of obtaining surface cracks by preheating the line of cut preparatory to the flame-cutting operation.

Typical chemical analysis and physical properties of Man-ten steel are given in Table XV.

Welds may be made on Man-ten steel by using various types of bare and shielded-arc type electrodes. Bare electrodes produce brittle welds with a tensile strength considerably below that of the base metal. Consequently, their use is not recommended if high quality joints are required. Low carbon shielded-arc electrodes produce ductile welds of high quality although they do not have as high a tensile strength as the base metal. Alloy shielded-arc electrodes will produce welds having physical properties comparable to the base metal in every respect.

The welding procedure to employ is similar to that recommended for plain low-carbon steels except that preheating should be used on heavy sections and in cases where the hard fusion zone may be objectionable.

Annealing at 1100 deg. to 1200 deg. F. after welding is recommended to increase the ductility of the heat-affected fusion zone and to improve the general quality of the joint.

Typical physical properties of welds made in Man-ten steel with molybdenum alloy shielded-arc electrodes are given in Table XVI.

Cor-ten Steel

Cor-ten steel is a commercial alloy containing chromium as an alloying element to increase the tensile properties with the possible addition of 0.30 to 0.50 per cent of copper to improve the corrosion-resisting properties. The carbon content of this steel is usually low. Consequently, it is not subject to air hardening and preheating is not required. Flame cutting can also be accomplished without difficulty.

The typical chemical analysis

TABLE XVII

Chemical Analysis of Cor-ten Steel

Carbon	0.10 per cent
Manganese	0.10-0.30 per cent
Silicon	0.5 -1.00 per cent
Chromium	0.50-1.50 per cent
Copper	0.3 -0.5 per cent
Phosphorus	0.10-0.20 per cent

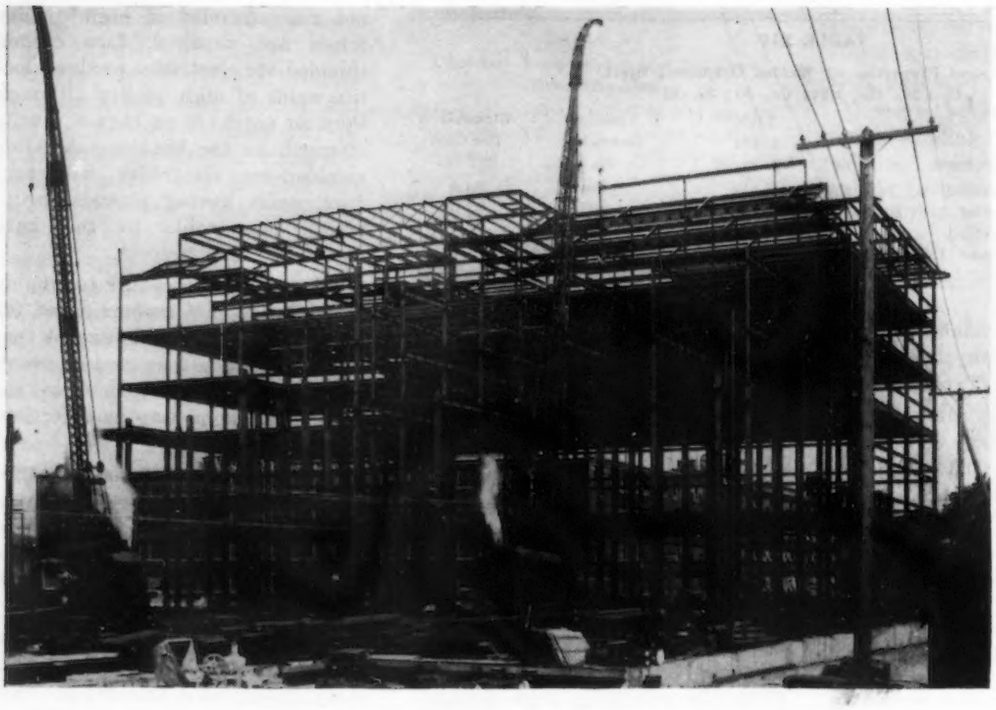
Physical Properties of Cor-ten Steel

Yield point, lb. sq. in.	50-60,000
Tensile strength, lb. sq. in.	65-75,000
Elongation, per cent in 2 in.	22-27
Reduction of area, per cent	40-55
Endurance limit, lb. sq. in.	45,000

TABLE XVI

Physical Properties of Welded Man-ten Steel
C, 0.27; Mn, 1.54; Si, 0.20; P, 0.04; S, 0.04

Condition	Yield Point Lbs./sq. in.	Tensile Strength Lbs./sq. in.	Elongation: Per cent in 2 in.	Elongation: Per cent free bend
As welded	53,000	90,000	15	32
Annealed 1200°F.	51,000	88,000	20	40



THIS arc welded warehouse and factory building contains 2800 tons of welded steel.

and physical properties of Cor-ten steel are tabulated in Table XVII.

Bare and shielded-arc electrodes can be used to weld this alloy, but the best results are obtained from the shielded arc types. (Bare electrode welds are inferior in strength, ductility, and soundness. The chromium content in the bare metal tends to produce porosity at the fusion zone.) Shielded-arc electrodes of the plain low carbon type are often used and the resultant welds have physical properties very close to those of the base metal. Alloy electrodes will produce welds with a tensile strength superior to that of the base metal.

Heat-treatment after welding is not required on this alloy, but it will improve the ductility of the joint. A slight lowering of the tensile strength is also obtained by heat-treatment. Standard strain annealing temperatures of 1100-1200 deg. F. are generally used.

Typical physical properties of welds made on Cor-ten steels with molybdenum alloy electrodes are tabulated in Table XVIII.

Yoloy Steel

Yoloy is a commercial alloy containing copper and nickel as alloying elements. This alloy is made with several carbon contents, but for welding purposes, the carbon content should be held below 0.20 per cent.

Copper has been used in steels for many years in percentages under .5 per cent as a corrosion inhibitor. It is only recently, however, that it has been used to increase the physical properties of steels.

The limit of solubility of copper in iron is about 0.35 per cent. Copper in excess of this amount precipitates out into the crystallographic planes and causes what is known as precipitation hardening. Maximum hardening is obtained by heat-treating at 900-950 deg. F. followed by rapid cooling. Slower cooling from 900-950 deg. F. or higher annealing temperatures tend to decrease the amount of precipitation hardening. The best impact properties accompanied by good tensile strength and ductility are obtained by normalizing at 1450 deg. to 1600 deg. F.

Yoloy steels with low carbon contents do not have air-hardening properties; consequently, they are easily welded and the resultant welds have good physical properties in the "as welded" conditions. Steels with carbon contents over 0.20 per cent should be preheated before welding and subsequently heat-treated for the most satisfactory results.

The typical chemical analysis and physical properties of a Yoloy steel of good weldability are given in Table XIX.

Shielded-arc electrodes of the plain low carbon, carbon molybdenum, or Yoloy types are generally used to weld this alloy. The Yoloy type electrodes have the

TABLE XVIII

Physical Properties of Welded Cor-ten Steel
C, 0.09; Mn, 0.22; Si, 0.5; Cr, 0.97; Cu, 0.38

Treatment	Yield Point Lb. sq. in.	Tensile Strength Lb. sq. in.	Elongation Per Cent in 2 in.	Elongation Per Cent free bend
As welded	50,000	77,000	22	35
Annealed at 1200°F.	49,000	75,000	24	40

TABLE XIX

Chemical Analysis of Yoloy Steel

Carbon	0.08 per cent
Nickel	1.99 per cent
Copper	1.02 per cent
Silicon	0.26 per cent
Manganese	0.60 per cent
Phosphorus	0.02 per cent
Sulphur	0.04 per cent

Physical Properties of Yoloy Steel

Yield point, lb. sq. in.	53,000
Tensile strength, lb. sq. in.	65,000
Elongation, per cent in 2 in.	28
Reduction of area, per cent	52

advantage that the resultant weld will respond to heat-treatment in a manner similar to the base metal.

No special technique is required in the welding of this alloy unless the higher carbon grades are used. Typical physical properties of welds made with Yoloy electrodes are given in Table XX.

R.D.S. Steel

This is a structural steel known as Republic Double Strength Steel which contains copper, nickel, and molybdenum as alloying elements. The copper in this alloy has the same influence on the properties of the base metal as that outlined for Yoloy.

For the best weldability it is recommended that the carbon content be low because the higher percentages of carbon produce some air hardening. When air-hardening tendencies are present preheating is recommended for welding and flame cutting. In such alloys subsequent heat-treatment after welding is also desirable.

The chemical analysis and physical properties of a typical R.D.S. steel are given in Table XXI.

TABLE XXI

Chemical Analysis of R.D.S. Steel

Carbon	0.095 per cent
Copper	1.44 per cent
Nickel	0.75 per cent
Molybdenum	0.07 per cent
Phosphorus	0.04 per cent max.
Sulphur	0.04 per cent max.

Physical Properties of R.D.S. Steel

Yield point, lb. sq. in.	67,800
Tensile strength, lb. sq. in.	82,000
Elongation, per cent in 2 in.	33
Reduction of area, per cent	54

The higher carbon content steels produce higher tensile properties with slightly less ductility.

Shielded-arc electrodes of the plain low carbon or molybdenum alloy types are generally used to weld these alloys. The alloy electrodes, of course, produce welds with the highest tensile properties. The welding technique employed is similar to that of plain low carbon steels. If preheating is required, it need not be greater than 500 deg. F.

Typical physical properties of welds made on R.D.S. steels with carbon-molybdenum electrodes are given in Table XXII.

(TO BE CONTINUED IN THE JANUARY 14 ISSUE)

TABLE XX

Physical Properties of Welded Yoloy Steel

C, 0.08; Ni, 1.99; Cu, 1.02

Treatment	Yield Point Lb. sq. in.	Tensile Strength Lb. sq. in.	Elongation Per Cent in 2 in.
As welded	55,800	65,000	33
Annealed 950°F. (1 hr.)	76,000	80,000	31
Annealed 1200°F. (1 hr.)	60,000	71,000	38
Annealed 1650°F. (1 hr.)	52,000	66,000	40

C, 0.22; Ni, 1.98; Cu, 0.92

Treatment	Yield Point Lb. sq. in.	Tensile Strength Lb. sq. in.	Elongation Per Cent in 2 in.
As welded	85,000	92,000	14
Annealed 950°F. (1 hr.)	80,000	95,000	12
Annealed 1200°F. (1 hr.)	69,000	88,000	16
Annealed 1650°F. (1 hr.)	65,000	80,000	18

TABLE XXII

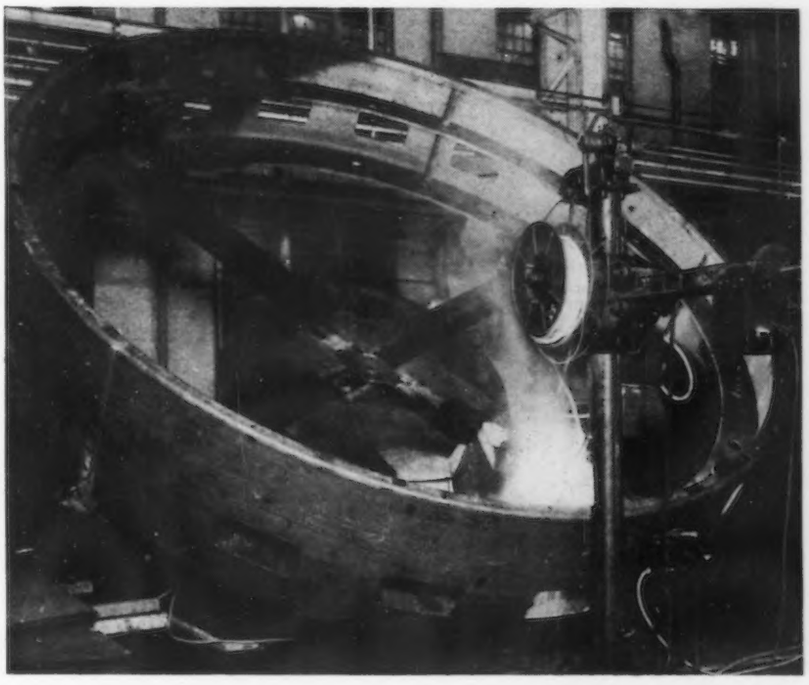
Physical Properties of Welded R.D.S. Steels

C, 0.95; Cu, 1.44; Ni, 0.75; Mo, 0.07

Treatment	Yield Point Lb. sq. in.	Tensile Strength Lb. sq. in.	Elongation Per cent in 2 in.
As welded	70,000	85,000	29

C, 0.2; Ni, 0.75; Cu, 1.30; Mo, 0.76

Treatment	Yield Point Lb. sq. in.	Tensile Strength Lb. sq. in.	Elongation Per cent in 2 in.
As welded	80,590	96,460	29
Annealed 950°F. (1 hr.)	93,870	104,620	22



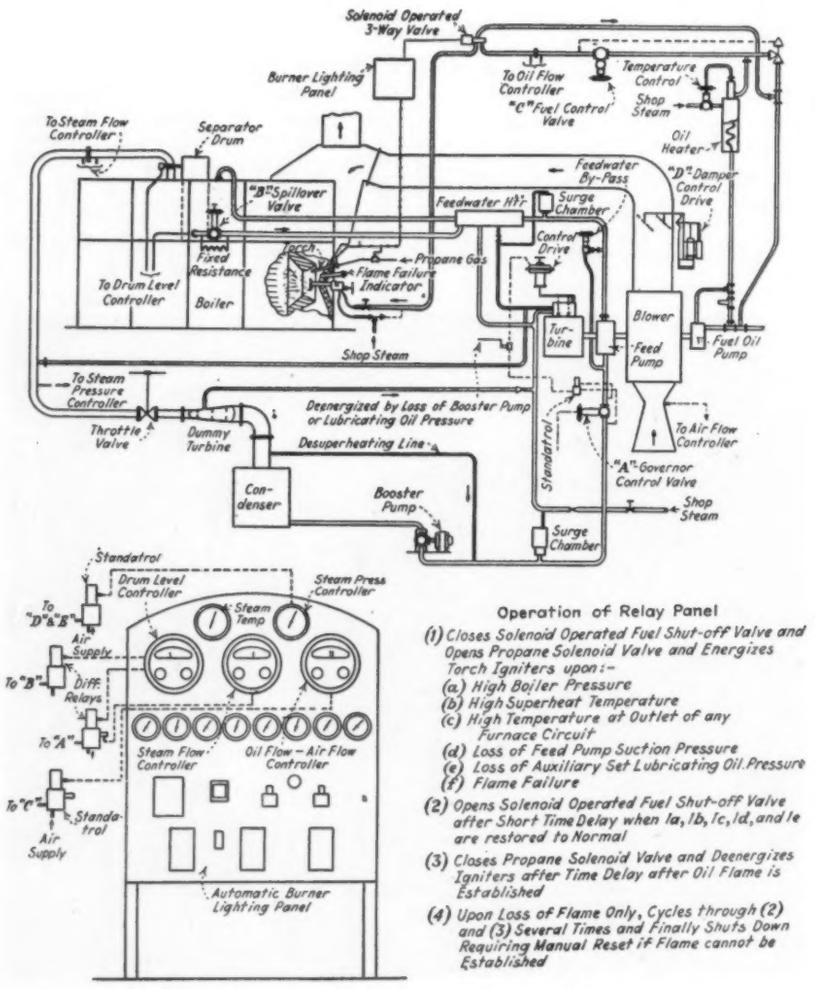
AUTOMATIC welding a generator frame on a welding manipulator.

The Steamotive — a Packaged Power Plant

DETAILS of a complete steam generating unit of new type, featuring relatively light weight and minimum of space requirements were given at the recent annual meeting of the American Society of Mechanical Engineers in a joint paper by A. R. Smith, General Electric Co.; E. G. Bailey, Babcock & Wilcox Co., and P. S. Dickey, Bailey Meter Co. In this new unit, named the Steamotive, steam is generated at high pressures and temperatures, and control in response to changes in demand is fully automatic. Because of the compact arrangement, the unit constitutes what is practically a packaged power plant.

Two of these units, which are intended for capacities from 2000 to 10,000 hp., have been built. The first, in service at the Lynn, Mass., works of the General Electric Co. in the testing of marine and other small turbines, has an output of 21,000 lb. of steam an hour at a pressure of 1500 lb. The other, a completely coordinated power generating plant, incorporating the Steamotive and turbine generator with a capacity of 10,000 lb. per hour and furnishing steam to a turbine at 1200 lb. per sq. in. and 950 deg. Fahr., is being installed in a small isolated plant of a large industrial concern to supply electric power and low pressure steam for building heating. Both units are oil-fired.

Two oil-fired Steamotive units, each with a capacity of 40,000 lb. an hour, are being constructed for the Union Pacific Railroad for driving two 2500-hp. electric locomotives. These will furnish steam to the turbine at 1500 lb. per sq. in. and 950 deg. F.



Operation of Relay Panel

(1) Closes Solenoid Operated Fuel Shut-off Valve and Opens Propane Solenoid Valve and Energizes Torch Igniters upon:–
(a) High Boiler Pressure
(b) High Superheat Temperature
(c) High Temperature at Outlet of any Furnace Circuit
(d) Loss of Feed Pump Suction Pressure
(e) Loss of Auxiliary Set Lubricating Oil Pressure
(f) Flame Failure

(2) Opens Solenoid Operated Fuel Shut-off Valve after Short Time Delay when Ia, Ib, Ic, Id, and Ie are restored to Normal

(3) Closes Propane Solenoid Valve and Deenergizes Igniters after Time Delay after Oil Flame is Established

(4) Upon Loss of Flame Only, Cycles through (2) and (3) Several Times and Finally Shuts Down Requiring Manual Reset if Flame cannot be Established

DIAGRAMMATIC layout of Steamotive unit used at the Lynn works for testing small turbines.

Objectives in developing the new equipment were high steam pressure and temperature, minimum weight and size per unit of steam produced, wide range of capacity with ability of the unit to respond quickly to wide variations in load conditions, adaptability to wide range of fuel, completely coordinated auxiliaries, completely coordinated automatic control, and construction in sizes small enough to be portable.

The Steamotive boiler was designed and built to these specifications by the Babcock & Wilcox Co. at Barberton, Ohio, and the meters and complete automatic control were developed by Bailey Meter Co., Cleveland. The auxiliaries which supply fuel, air and feed water are controlled in accordance with demands for steam. Complete automatic ignition and safety equipment are included.

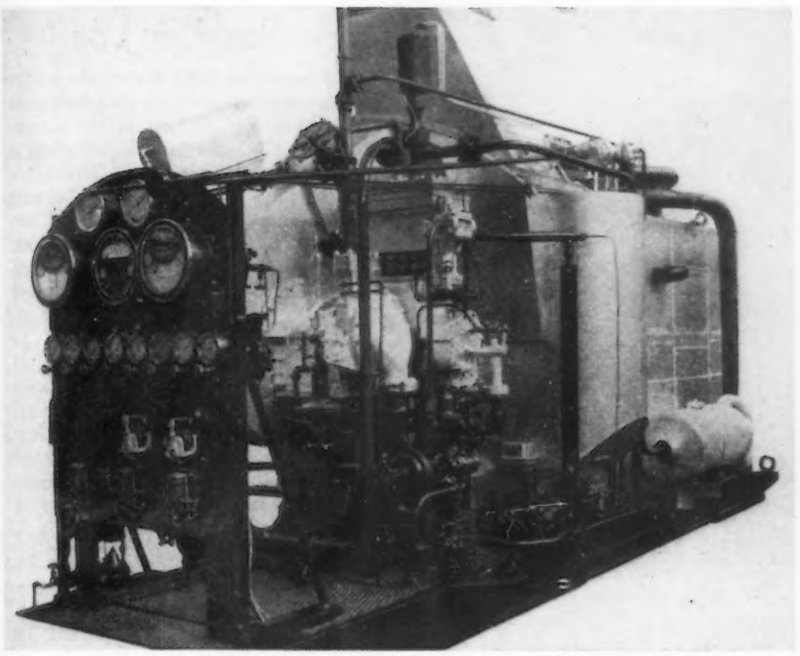
The auxiliary set was designed and built by the General Electric Co., which company also assembled the complete unit at its Schenectady plant.

The auxiliaries, geared together as one turbine driven unit in the case of the unit at Lynn, consists of a feed pump delivering 25,000 lb. of water per hour at a pressure of 2000 lb., a blower for 30,000 lb. of air per hour at 60 in. water pressure, a fuel oil pump, and a lubricating oil pump. The complete Steamotive unit was designed and constructed for installation in a locomotive in conjunction with turbine electric drive installed by the General Electric Co.

Operation of Steamotive

In the operation of Steamotive units the flame and gases pass from the burner through the completely water-cooled furnace, thence into the superheater, flowing around the separator through the economizer and air heater, and up the stack. The air for combustion leaves the blower at relatively high pressures, passing through lanes intersecting the stack and down around the air heater tubes to the oil burner. There is no induced draft fan, the blower forcing the air through the turbine and furnace under pressure.

The feed water enters the economizer inlet header, and after leaving the outlet header is divided into several circuits, all of which form the floors, sides and roof of the furnace, as well as the sets of loops forming the boiler screen. All the steam is generated in these furnace and boiler circuits, and enters the separator with a surplus of water in each circuit. From the separator the dry steam goes through the superheater and directly to the main turbine. The water from the separator is called the spillover, and it



GENERAL view of oil-fired Steamotive unit now in service at the G-E Lynn, Mass. works. High pressure and temperature, minimum weight and size per unit, and completely coordinated automatic control are features. Indicating its compactness: the unit pictured was shipped complete from Schenectady on a railroad flat car.

passes through a heat exchanger to a hot well, where it mixes with the condensate and is re-fed to the boiler by a pump.

Flexibility an Advantage

"The principal advantages of this type of unit over natural circulation boiler installations are the small space required and the reduction in weight of the unit," state the authors of the paper. "It is possible to set this type of boiler into a restricted space and the design is flexible in its adaptability to limit in height, width or length.

"The elimination of refractory in the furnace and boiler setting, replaced by water walls and insulating blocks, not only results in a large saving in weight and volume, but also in reduced heat capacity without materially affecting the ability to change output quickly. The small water content of the forced circulation boiler results in quick response to load changes and insures safety in spite of the high temperature and high pressure steam condition. These factors permit quick starting from a cold condition, requiring less than 10 min. from lighting the burner to full output.

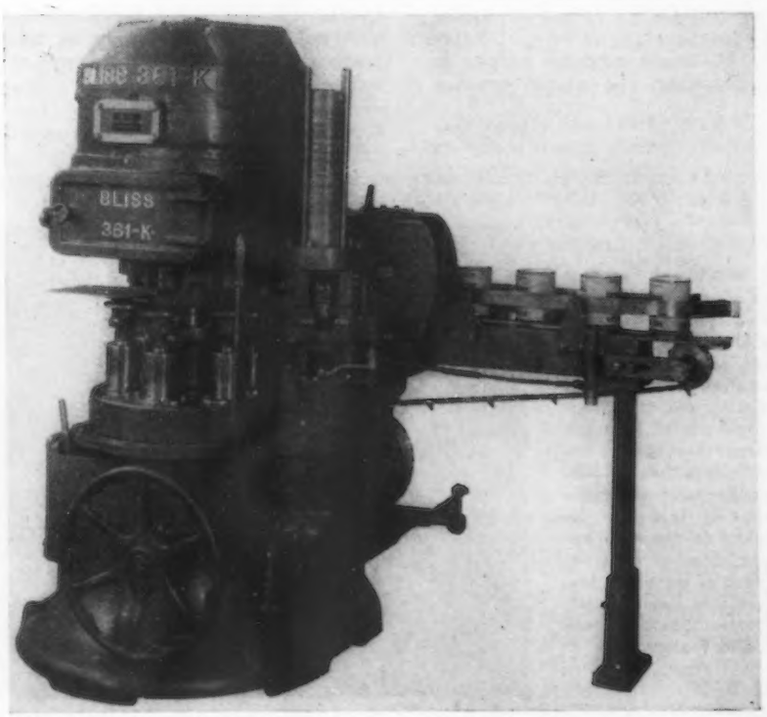
"It has been found that combustion liberation rates up to 400,000 B.t.u. per cu. ft. per hr. can be obtained with low excess air and smokeless combustion with oil fuel. The pressure furnace which utilizes forced draft only is entirely practicable, and materially simplifies the draft equipment and control."

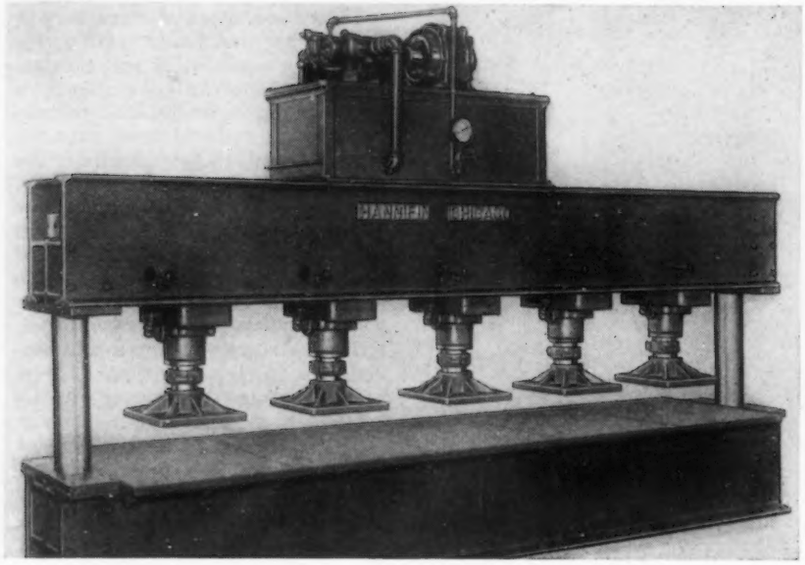
It was said to be essential that the application of a unit of this character be carefully considered, since reduction in weight and space requirements can only be obtained through an increase in auxiliary power and reduction of plant efficiency, especially at high load. In certain applications the problem is simple, since the space requirements are definitely fixed; however, where space is available it was said to be generally more economical to use a larger unit, improve boiler efficiency and reduce auxiliary power.

High-Speed Double Seaming Machine

A NEW high-speed double seamer with a non-spill can feed and marking device has been brought out for the canning trade by the E. W. Bliss Co., Brooklyn, The machine has a capacity for handling cans ranging in sizes from No. 1 to No. 3, and is arranged with a V-belt motor drive. This machine as furnished closes tops on filled 1-qt. cardboard body oil cans. Its speed is dependent on the speed with which the filler can supply it with filled cans. On this work it can be operated at a speed as high as 175 to 200 cans per min.

In seaming the bottoms of empty tin bodies this seamer, it is stated, is being operated at a speed of approximately 300 per min., while for seaming the bottoms of empty cardboard bodies the speed is 250 or more per min.





Press for Testing Refrigerator Tanks

THE 80-ton multiple-platen hydraulic press illustrated has been developed by the Hannifin Mfg. Co., 621 South Holmar Avenue, Chicago, for the high pressure testing of refrigerator body tanks. Tanks are placed on the bed of the press and as many platens as required are moved down into contact with the tank top.

Each platen is individually controlled by a single control lever, and is held automatically in position in contact with the tank top. The cycle of operation is automatically provided by a two-pump, hydraulic-power unit driven by a 3-hp. motor and incorporating a special valve unit. A rapid advance stroke is provided until the platen touches the tank, when the large volume pump is by-passed and idles at no-load. The high pressure pump provides a predetermined holding pressure and automatically maintains the platen in contact with the tank top regardless of the testing pressure applied to the tank. This operation is automatically adjusted for varying tank thickness. Platens are raised by releasing the control lever.

Platens are individually controlled and any or all of the platens may be used for individual testing of small tanks, or any number together for handling large tanks. The holding pressure may be adjusted to meet the requirements of various testing pressures.

New Box Car Loader

FOR handling bulk materials without creating dust or degradation in the loading operation, the Link-Belt Co., Philadelphia, is offering a new type box car loader. The anti-friction belt conveyor constituting the loading element of the machine is supported on a horizontal boom which is arranged so it can be rocked back and forth, or rotated 360 deg., by hand, on the castor-mounted truck on which boom is mounted. The conveyor is operated at a comparatively slow speed, and has a discharge height of 5 ft. Mounted on four large swiveling castors, the machine may be moved into and out of cars by three men. After it is in place, the services of but one man are required.

INSTALLATION of a 20-ton loom that will weave cotton belting in widths up to and including 84 in. has been completed by Victor Balata & Textile Belting Co. at its Easton, Pa., plant. This new loom will supplement other equipment for the manufacture of a complete line of belts for driving, conveying, and elevating, including another large loom installed in 1935, a loom producing belting having a maximum width of 63 in.

Establishment of a new metallurgical experiment station in the west, preferably at Salt Lake City, is recommended by the Bureau of Mines in its annual report. The bureau said that the new experiment station at Boulder Dam "will be barely adequate for pilot-scale testing of electro-metallurgical projects contemplated a year ago."

FOR small and medium size offices, as well as for home use, the Westinghouse Electric & Mfg. Co., has added to its line of air conditioning equipment this window mounted portable room cooler, a plug-in appliance that can be installed in less than 25 min. The cooling and dehumidification is said to be equivalent to the heat absorption obtained by melting ½-ton of ice every day. Compactness, and quiet, vibrationless operation are also featured.

Materials Handling as a Factor in Economic Production

(CONTINUED FROM PAGE 25)

modernization program. The photograph shown in Fig. 4 was taken some years ago in one of the machine shops of the Westinghouse Electric & Mfg. Co. at East Pittsburgh, and is typical of the days when old-fashioned lineshaft drives were considered quite correct. Note particularly the number of vertical drives, and the crossed belts overhead. Lighting conditions, in spite of the windows along both sides of the room and the skylights in the roof, were poor. In Fig. 5 is shown a recent photograph taken in a similar department of the same plant. The improved working conditions are very marked, and furnish one of the greatest arguments for the individual motorization of machines. Yet just as marked improvements can be had when modern group drive methods are employed, and the final determination of the question should not be predicated on the desire to eliminate a "forest of belts." Economy of production is the touchstone. Both individual motor drive and modern group drive methods aim at that factor. Rightly used, each has its place in the scheme of things industrial. And both methods are understood better today, and applied more correctly, than in pre-depression days.

The next article in this series will cover in detail various limitations at present existing in both modern transmission methods, and will suggest some of the lines along which improvements may be made.

Random Thoughts of an Idle Steel Man

(CONTINUED FROM PAGE 29)

and management. Worthy of attention also are the very important savings which may be affected by the appropriate use of the wide range of engineering materials now available.

Space limitations prevent more than the mere mention of these items.

These idle thoughts of an idle steel man have occurred during a period exempt of administrative activities, affording an opportunity for a somewhat wider view of a landscape unobscured by the proximity of the foreground shrubbery and some of the smaller trees.

Believing that they may be of some interest as a limited reconnaissance of the metallurgical field, they are here set forth, not as entirely original ideas, but as a brief list of some important items recognized by members of the industry as offering attractive possibilities in cost reduction or quality improvement. During the present somewhat introspective period of the industry this list is offered for the consideration of those who during the next decade will have the technical opportunity and the great personal pleasure of contributing the most brilliant chapter in the recording of the accomplishments of a great industry.

Gain in Structural Steel Work Expected

THE structural steel fabricating industry in 1936 achieved the first great improvement from depression lows, says V. G. Iden, secretary of the American Institute of Steel Construction in a year-end statement. "There had been an increase of some 25 per cent in volume in 1934," says Mr. Iden, "but a drop of 2 per cent in 1935 from the previous year. Until 1936 the upturn in business from the depression low had been slow but consistent. In 1936 this industry did a volume of business that was 40 per cent greater than in 1935. Coincidentally there is a renewed sense of the possibilities of structural steel and a confident expectation that the increase in business will not only continue but will probably advance some 15 per cent more during the coming year."

The structural steel fabricating industry shipped about 1,500,000 tons in 1936 compared with more than 3,300,000 tons in 1929. The institute expects that a large volume of grade elimination work will be carried on during 1937, the programs that were originally laid out having been only about half completed. It also looks for a large volume of bridge construction. Elevated vehicular highways are also making headway and being planned for such cities as Chicago, Detroit, St. Louis, Baltimore and Boston. The states and cities are now better able to finance these projects themselves.

While higher costs of material and labor may prevent such an increase in new construction in 1937 as 1936 registered over 1935, the institute hopefully predicts that "the volume will continue to increase."

Machinery Exports Rise 36 Per Cent

EXPORTS of industrial machinery from the United States in October were valued at $16,003,332, the highest monthly volume since June, 1931, and 36 per cent above the October, 1935, shipments valued at $11,778,274, according to the Department of Commerce.

The 36 per cent increase recorded in October, 1936, was distributed over most machinery lines. Decreased overseas shipments were made, however, of power-generating equipment which was valued at $837,195 compared with $911,528 a year ago; "other" metal-working machinery, $290,633 against $324,544 a year ago; and textile, sewing and shoe machinery, $1,569,452 compared with $1,629,439 in 1935.

Foreign shipments of construction and conveying machinery amounted to $1,636,385, 140 per cent above the corresponding figure for October, 1935, of $682,855. Sales of American mining, well and pumping machinery were valued at $3,343,102, 38 per cent above the October, 1935, exports valued at $2,430,059. And exports of power-driven metal working machinery amounted to $3,083,006, compared with $3,276,152 in October, 1935.

Increased sales of paper and pulp mill machinery, laundry machinery, blowers and ventilating machinery, air-conditioning equipment, cotton gins, and presses, and brewers, bottling, and oil mill machinery were primarily responsible for the gain in other industrial equipment exports to $3,453,024 from $2,524,805 in October a year ago.

Mesta Machine Co., Pittsburgh, has announced a Christmas bonus amounting to two months' salary for all salaried employees who have been with the company nine months or longer. Those employed since April 1, 1936, will receive a bonus proportionate to their length of service. Hourly workers were recently granted a pay increase of 10 per cent. The company is employing approximately 3500 workers compared with 897 on Jan. 1, 1933.

THIS WEEK ON THE ASSEMBLY LINE

. . . Settlement of Kelsey-Hayes Wheel and Aluminum Co. strikes eases labor tension over the Christmas holidays.

o o o

. . . Plate glass strike situation remains the chief threat to automotive production as Flat Glass Workers renew pledges of cooperation with United Automobile Workers.

o o o

. . . U.A.W. is concentrating its big guns on General Motors as second conference is sought on collective bargaining

o o o

. . . Total automotive production reaches 405,702 units in November; is expected to be around 475,000 units in December.

DETROIT, Dec. 28. — Detroit had a Christmas present in the form of relief from several serious strikes in the local area, although the clouded issue of plate glass still hangs in the background as the most serious threat to automotive production during the next few weeks. On Wednesday, Dec. 23, agreements were reached with the workers of both the Kelsey-Hayes Wheel plant and the Aluminum Co. of America. In both settlements the Ford Motor Co. played a prominent part as the principal customer of wheels and brakes on the one hand and cylinder heads and manifolds on the other. Although the managements of both these parts plants had taken rather strong stands earlier in the week against further negotiations until the workers were out of the plant, it is quite evident that the need for parts felt by the Ford Motor Co. was paramount in the issue.

The management of Kelsey-Hayes Wheel had steadfastly refused to negotiate until all workers were out of the plant, but on Wednesday morning George W. Kennedy, president of the company, made an offer indicating that the minimum wage of 75c. an hr. would be established for both men and women, the matter of overtime pay and wage increases for those earning more than the minimum would be adjusted, and that work would be resumed as soon as the plants were free of men. The offer was signed in the office of Harry Bennett, personnel director of the Ford Motor Co. This offer the workers were only too glad to accept after 10 days of sitting down in the plant and the men went back to work on Monday morning, following the holiday weekend.

The Aluminum company made its settlement through a Federal Labor Department conciliator and agreed to adjust pay rates, return strikers to work without discrimination and to discuss with the workers "at reasonable intervals" all questions regarding working conditions. The management had consistently refused to negotiate with national officers of the United Automobile Workers, who, although they had no representation in the plant at the start, had succeeded in lining up a large number of employees during the course of the strike.

Politics Playing a Part

There are several significant factors in the labor situation that should be noted. In the first place, at the Kelsey-Hayes plant, which normally employs between 4000 and 5000 men, there were only 200 UAW members in the plant at the time the first sit-down occurred. This was purely a spontaneous affair and was not a part of the general union strategy. It was the management who took the initiative to call in the UAW local officers and ask them to do something about the sit-in strike. It was the third sit-down in three days that finally closed the plant and each affair produced more con-

cessions on the part of the management. The final stand taken by the company not to negotiate until all sit-down strikers were out of the plant seemed a reasonable one and was looked upon as a sound policy in combating this rather unfair type of labor weapon.

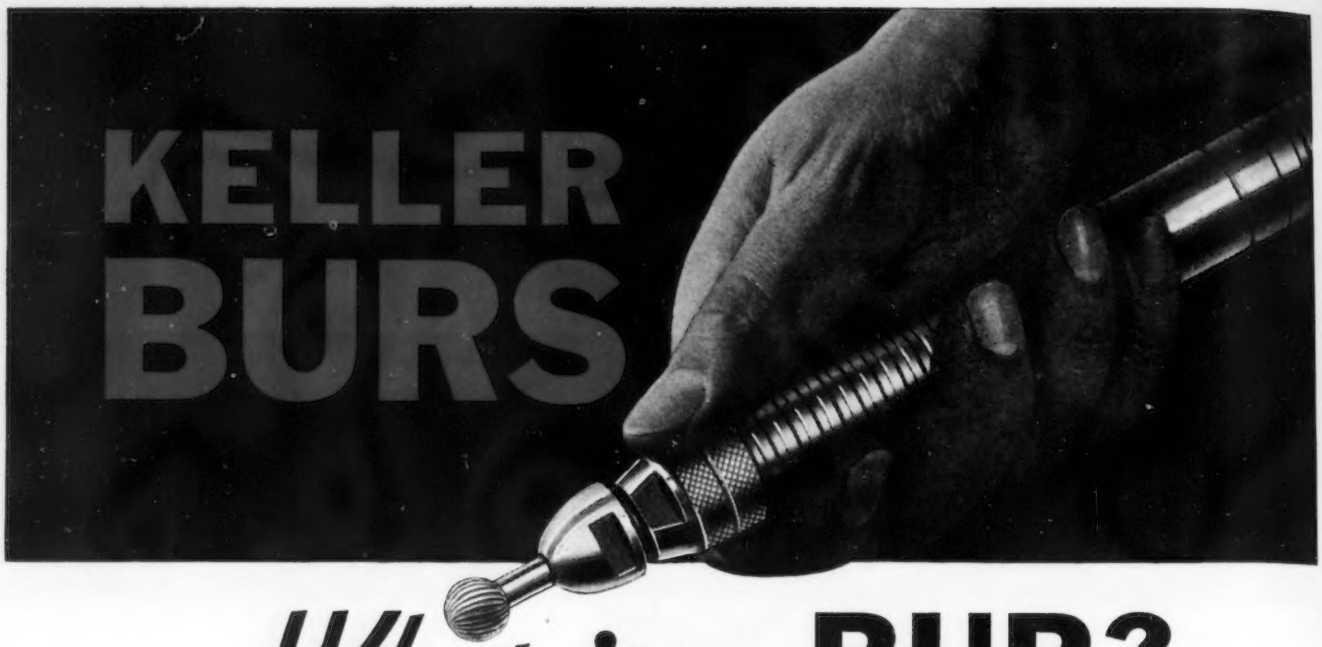
The first break came when the Ford Motor Co. gave notice that it planned to institute replevin action in the civil courts to recover its dies from the Kelsey-Hayes plant. It is the practice in the automotive parts business for the customer to own the dies and it is not uncommon to see the words "Property of Ford Motor Co." in parts plants supplying that manufacturer. This civil action was interpreted as a formality in order to obtain the protection of the law in removing such property from a plant that is picketed both inside and out by striking men.

Incidentally, authorities of the city find no law on the books that would permit them to eject workers from a plant as long as they peacefully occupy the premises. The fact that the police commissioner has ambitions for the mayor's job next year may have something to do with the unwillingness of the police and the prosecuting attorney to antagonize the labor vote, which was so amply demonstrated in the last election. In the last serious strike that occurred in the city at the Motor Products Co. plant, the police did not hesitate to use strong-arm methods in breaking up picket lines, and the change in attitude in this respect is a marked one.

Michigan's new governor, going into office on Jan. 1, leans very heavily in the direction of organized labor. Frank Murphy's influence has already forced his predecessor to take last-minute action on a state social security bill and the manufacturers look for legislation in 1937 dealing with industrial diseases, unemployment insurance and what will practically amount to a State NRA. In other words, the whole political aspect of employer-employee relations has taken an abrupt turn toward organized labor in the last few months.

Homer Martin, president of the UAW, asked for a conference with William S. Knudsen, executive vice-president of General Motors last week and got it. He presented various alleged discrimination cases and other grievances. Mr. Martin was advised to take the various matters up with the plant manager or, if necessary, with the general manager having jurisdiction over the location involved, in con-

ENTRY of General Motors Truck into the ½-ton field, with a chassis selling for $395 f.o.b. Pontiac, is indicative of the swing toward lighter vehicles. Approximately 60 per cent of 1936 truck registrations, which topped the 1929 record, were Fords and Chevrolets.



What is a BUR?

Many executives do not realize the many jobs this small inexpensive handy tool will do. A bur is a rotary file or mill cut tool, shaped to do a particular job or to reach a difficult place. Often a bur driven by a flexible shaft will do work that otherwise would be impossible or highly expensive.

Here are a few places where Keller Burs are used:

Aluminum Foundries and Aircraft Manufacturers
To remove excess metal and parting line from the fins of cylinder heads.

Brass Foundries
For cleaning castings.

Welding shops
To remove high spots left by welding process.

Glass and Bakelite Manufacturers
For finishing moulds.

Die Shops
For finishing all kinds of dies from the smallest jewelry dies to those used in forming automobile bodies.

Machine Shops — Large and Small
For bench work such as countersinking holes impossible to get at in the usual manner; removing burrs left after machining surfaces—such as worms, chucks, worm gears, etc.

Our catalog S-451 illustrates over 300 various shapes, types and cuts. We shall be glad to send it upon receipt of your request.

PRATT & WHITNEY DIVISION
NILES-BEMENT-POND COMPANY
KELLERFLEX SALES DEPT., HARTFORD, CONNECTICUT

formity with the corporation's operating policy. This was on Dec. 22. Apparently this did not satisfy Mr. Martin, although approaches were made to the local management regarding the strike that has tied up the Kansas City Fisher Body and Chevrolet plants for the past week. Last Friday a second letter was dispatched to General Motors in which another general conference was asked for the purpose of discussing and negotiating matters relating to collective bargaining, seniority rights, the "speed-up" rates and methods of pay and other conditions of employment. Martin stated that he felt that these issues were national in scope and were determined by the policy of the corporation as a whole. He charged either misunderstanding or deliberate evasion of the issues first presented.

Between his first talk with Mr. Knudsen and the dispatch of the second letter, Martin had been in conference with Glen McCabe, president of the Flat Glass Workers Union and had apparently been influenced by his discussion with McCabe. The following day McCabe reiterated the desire of his union to join forces with the UAW on all matters pertaining to "forcing recognition of our rights." He also stated that his organization is going to work in close conjunction with the UAW in helping to force their demands on General Motors and other large automobile manufacturers in the matter of collective bargaining.

This matter of collective bargaining needs clarification as to definition. As now interpreted by organized labor, it means not a compromise between two viewpoints, but complete surrender of the management on all points asked. Mr. McCabe charges, for example, that up until now his union had no difficulty in arriving at a satisfactory agreement with the glass companies. He charges them as being unwilling to subscribe to the principles of collective bargaining today because of the domination of General Motors and other automobile manufacturers. The facts of the case are that both the Pittsburgh Plate Glass Co. and Libbey-Owens-Ford have refused to knuckle down and accept a completely closed shop and the check-off. On all other matters relating to wages and working conditions, the companies are willing to negotiate.

Glass Shortage May Be Serious

The shortage of glass is a real threat to automotive production today and will have far-reaching ramifications if ultimate shut-down of the big plants is brought about. The plants of the Pittsburgh Plate Glass Co. have been down since Oct. 24, over two months, and the bank of glass that was then built up cannot last forever. Close estimates today are that Chrysler may be forced to curtail operations by Jan. 10. Parts releases are being held up already. A factor in this situation that has been largely overlooked is that the glass furnaces have been allowed to cool down and it will take four or five weeks to start them up again when a settlement is finally reached.

General Motors situation is much more enviable as compared with Chrysler's, since Libbey-Owens-Ford has been affected only since Dec. 15 and there was plenty of advance warning to enable the Fisher Body Division to build up large banks of glass. Estimates of this bank run as high as a six months' supply, stored in warehouses and box cars all over the country. Libbey-Owens-Ford has kept its furnaces up to heat so that it can resume operations immediately when the present conflict is over. The sit-down strikers are cooperating to this extent. In fact, they are working their sit-down according to their regular 6-hr. shifts. The Ford Motor Co. has its own plate glass manufacturing facilities, but union officials doubt that Ford's production of acceptable glass is very large.

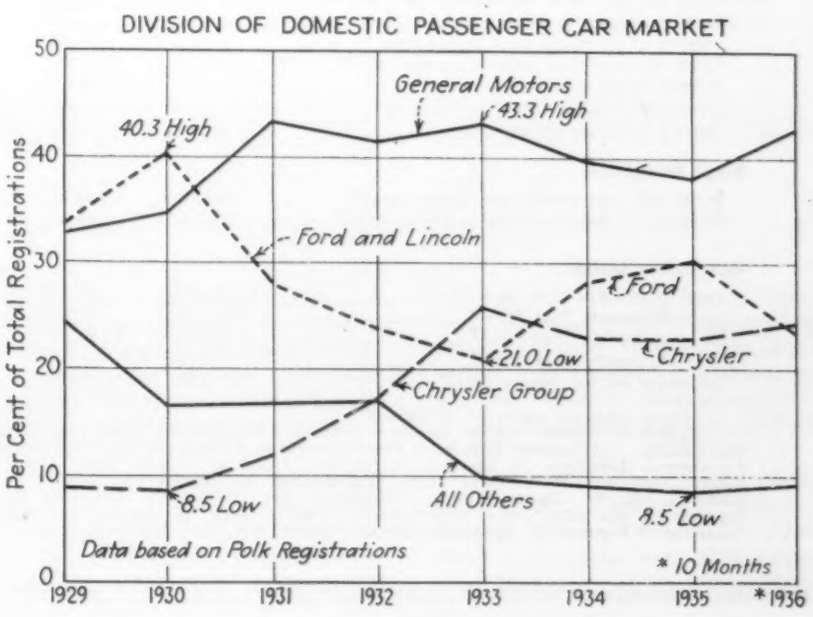
Automotive assemblies sagged last week, owing to the holiday and the fact that most plants closed down at noon on Thursday. There were a few exceptions, notably Cadillac, which resumed operations on Saturday to catch up on a shortage of component parts to feed the assembly line. Cadillac, incidentally, tooled up this year for 230 assemblies a day, but hit as high as 297 units one day this month. The company has been working on a 45-hr. week and paying time and a half for the five hours over the 40. Other General Motors units have been sticking more closely to the 40-hr. week as a result of the recently inaugurated policy of paying time and a half beyond that limit.

Output Lower Last Week

Production of passenger cars and trucks in the United States and Canada for the week ended Dec. 26 is estimated at 81,482 units, according to Ward's Automotive Reports. This compares with 122,960 units last week and represents a 3½-day week, as compared with the normal 5-day week in the industry. Ford's assemblies dropped from 25,700 to 16,000; General Motors dropped from 53,450 to 34,810; while Chrysler totals for the week were 18,900 units as compared with 24,550 the week before. Total assemblies for the current week should not be much different.

The Bureau of Census figures indicate that total automobile production during November was 405,702 units in the United States and Canada. This compares with 229,989 cars and trucks in October and with 408,555 in November, 1935. December production should

(CONTINUED ON PAGE 63)



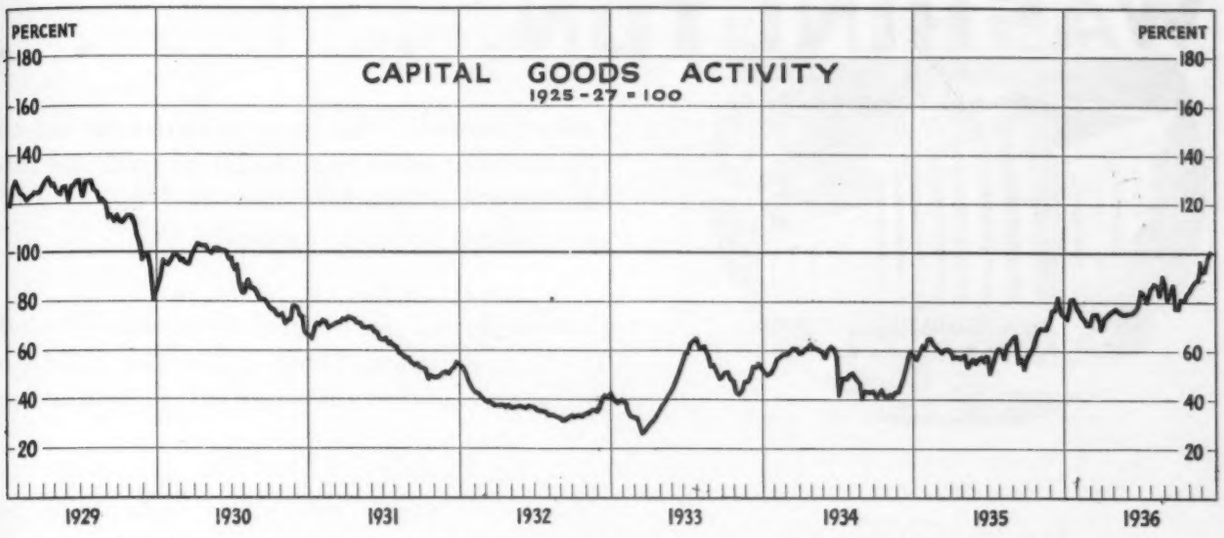
Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available.

	November, 1936	October, 1936	November, 1935	Eleven Months, 1935	Eleven Months, 1936
Raw Materials:					
Lake ore consumption (gross tons)[a]	4,269,049	4,384,809	3,025,694	27,760,943	40,087,983
Coke production (net tons)[b]	.....	4,307,849	3,217,175	31,720,422	.....
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	2,947,365	2,991,887	2,065,913	18,901,349	27,503,760
Pig iron output—daily (gross tons)[c]	98,246	96,512	68,864	56,591	82,101
Castings:					
Malleable castings—production (net tons)[d]	.....	51,778	44,277	420,797	.....
Malleable castings—orders (net tons)[d]	.....	55,521	47,778	410,038	.....
Steel castings—production (net tons)[d]	.....	74,775	36,165	361,195	.....
Steel castings—orders (net tons)[d]	.....	59,431	32,714	359,618	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	4,337,412	4,545,001	3,150,409	30,344,580	42,487,717
Steel ingot production—daily (gross tons)[e]	173,496	168,333	121,170	106,100	148,558
Steel ingot production—per cent of capacity[e]	79.05	76.70	54.73	47.93	67.69
Finished Steel:					
Trackwork shipments (net tons)[e]	4,756	5,547	3,090	39,204	63,234
Steel rail orders (gross tons)[e]	123,875	119,237	81,721	445,020	927,940
Sheet steel sales (net tons)[f]	294,080	223,195	289,101	2,270,171	2,383,572
Sheet steel production (net tons)[f]	224,031	235,057	224,541	2,216,216	2,367,559
Fabricated shape orders (net tons)[g]	117,798	127,303	91,693	972,368	1,429,348
Fabricated shape shipments (net tons)[g]	128,306	152,999	94,746	1,019,002	1,413,352
Fabricated plate orders (net tons)[d]	.....	33,791	19,116	222,731	.....
Reinforcing bar awards (net tons)[e]	18,740	22,135	11,475	289,315	316,240
U. S. Steel Corpn. shipments (tons)[h]	882,643	1,007,417	681,820	6,709,784	9,757,767
Ohio River steel shipments (net tons)[i]	127,425	145,065	88,338	864,508	1,057,871
Fabricated Products:					
Automobile production, U. S. and Canada[k]	394,890	229,989	*408,550	*3,701,594	4,097,725
Construction contracts, 37 Eastern States[l]	$208,204,200	$225,839,900	$188,115,000	$1,580,408,400	$2,475,600,300
Steel barrel shipments (number)[d]	.....	924,797	634,396	6,331,077	.....
Steel furniture shipments (dollars)[d]	.....	$1,776,784	$1,591,286	$13,965,584	.....
Steel boiler orders (sq. ft.)[d]	.....	968,473	464,431	5,560,423	.....
Locomotive orders (number)[m]	.....	22	0	28	.....
Freight car orders (number)[m]	.....	1,310	25	8,128	.....
Machine tool index[n]	147.1	136.5	98.6	†93.8	†134.0
Foundry equipment index[o]	200.4	174.4	100.4	†122.9	†178.6
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	64,509	56,637	45,461	.....
Imports of pig iron (gross tons)[p]	.....	7,264	15,550	114,648	.....
Imports of all rolled steel (gross tons)[p]	.....	29,730	17,089	193,851	.....
Total iron and steel exports (gross tons)[p]	.....	261,882	205,242	2,828,067	.....
Exports of all rolled steel (gross tons)[p]	.....	132,434	88,008	812,159	.....
Exports of finished steel (gross tons)[p]	.....	110,886	68,324	688,831	.....
Exports of scrap (gross tons)[p]	.....	119,568	104,961	1,902,429	.....
British Production:					
British pig iron production (gross tons)[r]	643,100	670,300	525,100	5,862,700	7,010,200
British steel ingot production (gross tons)[r]	1,001,300	1,060,500	903,300	9,030,900	10,679,800
Non-Ferrous Metals:					
Lead production (net tons)[s]	43,625	42,156	40,369	379,744	415,896
Lead shipments (net tons)[s]	50,153	59,210	43,035	391,123	451,169
Zinc production (net tons)[t]	45,742	46,297	37,469	390,949	477,221
Zinc shipments (net tons)[t]	57,107	54,035	48,172	423,658	593,452
Deliveries of tin (gross tons)[v]	5,345	6,005	4,035	53,750	77,075

†Three months' average. *Revised.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corp.; [i] United States Engineer, Pittsburgh; [k] When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of Census; [l] F. W. Dodge Corp.; [m] *Railway Age;* [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange.



Weekly Index of Rate Activity in Capital Goods, Adjusted for Seasonal Variation, 1925-27 Average = 100

THE IRON AGE Weekly Index Numbers of Capital Goods Activity

(1925-27 Average = 100)

Last week	97.2*	Same week 1933	54.5
Preceding week	100.1	Same week 1932	40.1
Same week last month	95.2	Same week 1931	55.7
Same week 1935	75.8	Same week 1930	67.7
Same week 1934	60.1	Same week 1929	80.4

* = Preliminary.

BUSINESS activity in the durable goods industries fell off last week because of holiday interruptions. THE IRON AGE's index of this activity accordingly declined 2.9 points to a preliminary figure of 97.2 per cent of the base-period average or "normal," but continued to show marked strength considering the season. The tentative 97.2 level of the index was again substantially higher than for any corresponding week back through 1929, or since records have been kept. The comparable figure for that period was 80.4. Last year at this time the index stood at 75.8.

Specific factors which influenced the general industrial situation last week, as reflected by movement of the separate series included in the capital goods barometer, were decreases in steel mill and automotive activity. Both indices dropped more than seasonally, but automobile production was by far the largest loser. Heavy engineering construction volume lessened somewhat. The usual weekly estimate of freight carloadings of forest products was delayed, and figures for the period therefore are preliminary.

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Cram's Reports, Inc.; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

Bohn and Fisher Body Employees Strike

DETROIT, Dec. 28.—A sitdown strike was initiated Monday morning in plant No. 3 of the Bohn Aluminum & Brass Co., Detroit, over the alleged discharge of several workers for union activity. About 300 out of 400 employees were involved as the strike started. This action was another example of one of those spontaneous affairs in a plant that was previously practically unorganized, yet negotiations are being handled by officers of the UAW.

At noon, Monday, the Fisher Body plant at Cleveland was completely tied up by a sitdown strike as an indication of impatience on the part of workers in one small department. Arrangements had been made with the management for a conference at 2.30 p. m., but before this meeting took place a sitdown occurred because a particular grievance was not settled on the spot.

UAW officials conferred with General Motors officials at Kansas City on Monday to settle a strike there. Workers had withdrawn from that plant on Christmas Eve.

WASHINGTON . . . . . .

. . . Labor troubles the most serious threat to recovery as new year begins; will the administration sit idly by and see 1937 prosperity short-circuited?

o o o

. . . Congress will be asked to consider new legislation giving labor a tighter hold on industry; conference considers proposed laws.

o o o

. . . Failure of steel and other industries to quote on Government requirements under Walsh-Healey Act raises serious question.

o o o

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

o o o

WASHINGTON, Dec. 29.—Whatever the infant 1937 may pleasantly discover in the way of an "era of good feeling," his youthful eyes will blink with offsetting disappointment when he surveys the labor situation. And, if the youngster is at all precocious, he will not be content with the smug observation that labor trouble is healthy because it is a sign of recovery. For if he does, he should be reminded that he is seeing an exposition, which because of its proportions and character, never has been witnessed by any of his forebears. That recovery is threatened should be plain even to a fledgling. It may be that some labor gestures are subject to strong discount, but potentially there are prevailing elements that have the stuff for breeding widespread paralysis of industry and unemployment of added millions, and at a time when industry is having it hammered into its head daily that the responsibility for recovery is its very own.

Labor as represented by John L. Lewis's Committee on Industrial Organization agitates on wide fronts. This at a time when industry is getting back into its stride, and absorbs growing numbers of workers whom the Government wants to strike off its relief rolls.

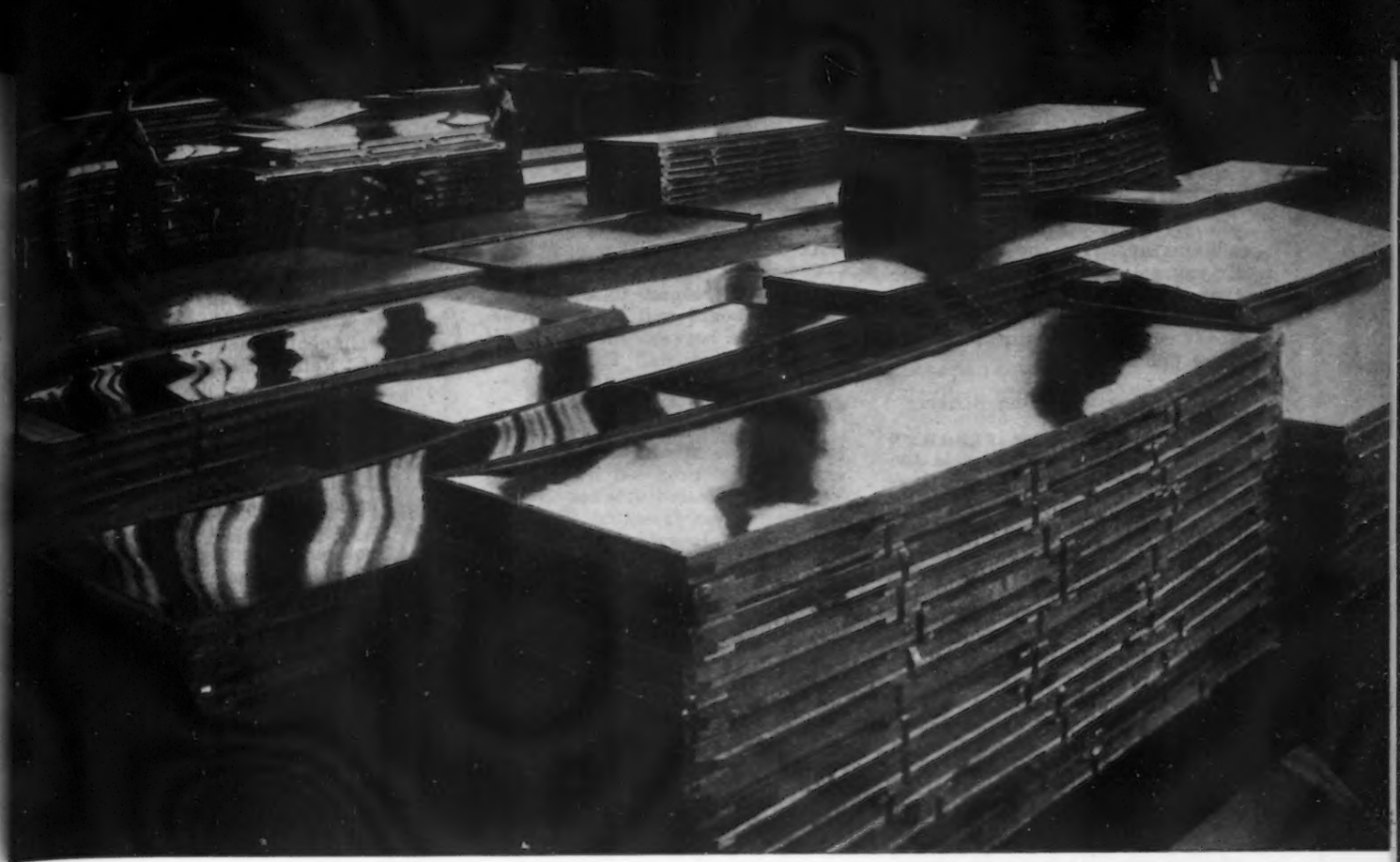
The CIO protests it doesn't want strikes. It wants to avoid them. It wants to bring an end to the "confusion." But on its own terms. Not on terms of industry, no matter how fair those terms may be. Not on the terms of the majority of workers who do not want to join the CIO.

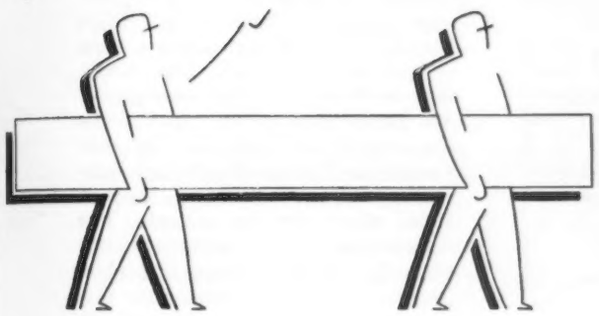
It has power to make trouble. That has been clearly demonstrated. The choking down of large industries by tieing up or crippling "feeder" units has cost millions upon millions in money both to major industries and their supplying units. And millions upon millions to workers who have been made idle against their will.

A Labor Empire

What is this but an attempt to set up a labor empire? A labor monopoly, with no responsibility in a real sense for destruction to life and property? Fear of political reprisal at the hands of labor has rendered practically useless the power (State and Federal) to prosecute for civil damages. And unless the wholesale threats of strikes and strikes themselves bring public revolt no such action may be expected. Nor need there be anything expected to result from renewed talk of Federal legislation requiring unions to incorporate. The modified O'Mahoney bill to require Federal licensing of manufacturers, to be granted only upon agreements to standards of hours of work and collective bargaining, —requirements in themselves that are entirely fair—is only one-sided. It does not lay at the door of labor the responsibility for damages it may cause. It will not do so. In this respect the bill is notable for an omission against protests of industry that applies to the National Labor Relations Act, administered by a decidedly pro-CIO triumvirate. And, as an aside, it may be remarked that included among its critics are some American Federation of Labor officials, whose hostility to the rebellious CIO grows as the CIO monopolizes great volumes of newspaper space generously given over to repetitious blustering statements on its campaigns, peppered with threats.

Certain it is that, for the present at least, the spectacular, though tiresome, moves of the CIO have, with rare exceptions, crowded the American Federation of Labor publicity to the back pages. Which has caused some comment that the parent organization is smarter than it would appear. The thought being that it is waiting—and hoping—that the CIO will wreck itself as it proceeds on its rampage, leaving the field more fertile for the craft unionists. President Green of the American Federation has said the CIO will never succeed. Mr. Green no doubt is prejudiced. But there are many groups who share his opinion. They realize nevertheless that the CIO already has made much trouble and that it can make much more. Having strongly helped in the New Deal campaign, it also appears to be a position where it is largely insulated against administration interference. Though what the administration may be compelled to do remains to be seen for it hardly would seem that the administra-





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tion would sit by and see recovery entirely short-circuited and the millions added to the relief rolls. To say nothing of seeing still further rises in costs of living, already a disturbing factor. And John Q. Consumer begins to murmur a little more audibly.

Government Financing Strikers

However, these are strange times. For example there is the unusual thing of the Federal Government financing strikers. And also the unusual thing of organized labor officials nonchalantly asking WPA to provide funds for strikers as Lewis recently did. No matter what the lack of merit of the strike the spectacle of taxpayers being required to contribute to the support of strikers is a present-day phenomenon. Why would it not be just as logical, as a matter of fairness, to finance an industry that has been rendered idle through no fault of its own?

So far as known, the American Federation of Labor has not adopted the CIO tactic of asking the Government to finance strikes. If not that only adds to the differing policies between it and the CIO. But the rub is going to come when the conflicting policies of the two organizations are laid at the door of the administration or one of its subordinate bodies, such as the National Labor Relations Board. So far the board, ready enough to crack down on industry, has shied timorously and declared a virgin neutrality as between the two organizations. Nevertheless, it is charged with being strongly pro-CIO. It is likely that soon or late —depending on Supreme Court action with respect to the Labor Act—the board will have to pass upon issues between the two rival labor organizations. That will be an unhappy, not to say embarrassing moment, for the board.

Both organizations appear, however, to be in accord with the general lines of proposed legislation. This was indicated at a conference representatives from the CIO and the A. F. of L. held recently with Secretary of Labor Perkins. Among those present were Lewis, Sidney Hillman and Francis J. Gorman of the CIO group and Frank Morrison, vice-president of the A. F. of L.

Discussion was given over the following proposed laws:

Black 30-hr. bill, O'Mahoney licensing bill, or a modified NRA—or combination of all three.

Abolition of child labor and initiation of minimum wages.

Cooperation of Government, labor and management "to stabilize employment."

Reducing to between $300 and $2000 the present limit of $10,000 exemption on Government contracts under the Walsh-Healey Act.

Promotion of housing legislation, particularly low-cost projects.

30-Hr. Week Not Probable

The talk of the 30-hr. week is not taken seriously. There are labor leaders who really favor it, but it is strongly doubted that the more prominent leaders want it or expect it. Rather it is looked upon as a trading matter, designed to bring down hours—the Supreme Court permitting—from their present level but not to any economically ruinous level such as 30-hr. The labor agitation now under way gives an aberrant touch to the suggestion of cooperation of Government, labor and management. The latter not being represented had no chance to point out the great obstacle being placed in its way to block cooperation.

Refusal of industries to bid under provisions of the Walsh-Healey Act already has made it a serious problem as to how the Government is to obtain supplies, including those for the national defense. Miss Perkins has rigidly insisted upon no exemptions and has been supported by a ruling of Acting Comptroller General Elliott. She has, in reply to a War Department request, defined "open market purchases" which are exempt from provisions of the act. The definition in short says these exemptions are those that do not call for the advertising of proposals by contracting officers. Steel and machinery are in the long list of items which are not exempt. The exemptions are the exceptions, not the rule. Now the organized labor groups want to tighten the law further, with the hope that it will prove so onerous in trying to separate Government and private business that industry will prefer to accept the law for both rather than to be put to the expense and worry of keeping records as now is required. Thus a modified NRA would be put further into effect by the strategy of reducing the exemption limit, unless Government business was passed by entirely. Of course such as impasse could not exist long. Nor can the present difference between industry and the Government over the provisions of the act. The effectuating of an NRA by way of the Walsh-Healey Act so far has failed wholly of its purpose.

Seeing that the A. F. of L. and the CIO are in agreement as to a legislative program—or at least as to its principles—it may be they can yet coalesce further on principles. Say as to the best kind of a stance when strikes are declared: Standup or sitdown; horizontal or vertical.

★

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Weirton Steel Co. Employees Operate All Phases of Their Own Organization

MORE than 97 per cent of eligible workers voted in the annual election of representatives held recently by employees of the Weirton Steel Co., according to Jack Larkin, general chairman of the employee representatives.

The total number that voted exceeded the number at work on the day of election by almost 1000. The number of eligible workers was 9539, while 9263 or 97.11 per cent cast ballots and 8339 were working in the mills during the 24-hr. period of the election.

The total vote was less than usual this year because no election was held at Weirton Steel Co.'s Clarksburg plant, which is not operating at present. The rules committee of the employee representatives decided to postpone the election at Clarksburg until operations were resumed. In the meantime, the five Clarksburg representatives elected for the year 1936 will continue in office. Elected employee representatives will serve from Jan. 1 to Dec. 31, 1937. Representatives reelected Jack Larkin general chairman and Norman Moore general secretary for the coming year.

The employee representatives represent their fellow employees in all relationships with the company. A provision of the by-laws for the representation plan states that all questions or increases or decreases in wages shall be submitted to the representatives and must have the approval of the general body before action.

The Weirton employee representative plan is operated entirely by employees. Management does not participate in any phase of the annual elections, nor does the plan include any joint committees made up of management and employees representatives. Management representatives are present at employees representatives' meetings only when invited by the employees.

The elections are entirely in the hands of the employees. They select their own election boards and other election officials, who supervise the polls, make decisions on eligibility of employees, tabulate the vote and conduct all other election proceedings, entirely independent of any influence of the management.

Following each election, the entire body of representatives elects a general chairman and general secretary, and each unit also elects its own chairman and secretary. Each unit also elects one representative to serve on each of the five general committees which are a vital part of the Weirton plan.

The speed with which satisfactory adjustments can be effected is one of the outstanding features of the Weirton plan, according to Mr. Larkin. In cases where an individual or a group of employees have matters which they believe should be adjusted, they bring these matters to the attention of the employee representative of their department, who takes them up with the foreman, superintendent, or other executive of the department who is immediately affected. Many matters are adjusted at this point, but when a satisfactory decision cannot be made, the employee representative brings the matter before his unit committee. This com-

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mittee reviews and investigates all facts in the case, entirely independent of management, and determines whether or not it will support the employee or group raising the issue. Final action is taken by a majority vote, before which all interested parties are given the opportunity to appear before the committee.

If the unit committee supports the position of the employee and fails to secure satisfactory adjustment, it refers the matter to the general committee on appeals, which also has power to review and investigate the facts and to affirm or reverse the finding of the unit committee. The appeals committee can carry the matter directly to the president of the Weirton Steel Co., and, if not satisfactory adjustment is then made, can have the case arbitrated.

The employee plan by-laws provide for an arbitration board composed of three members. One member is appointed by the employee representatives; one member is appointed by the company management, and these two members select the third member. The decision of the arbitration board is final.

In the hundreds of cases which have been handled by the employee representatives, Mr. Larkin said, few have gone as far as the appeals committee, and only one has gone before an arbitration board. The arbitrated case involved the discharge of an employee for the infraction of rules, and the arbitration board supported the action of the management.

In addition to representing employees on matters connected with wages, hours, and working conditions, the employee representatives conduct regular activities designed to improve safety and housing, and also carry out a year-'round recreation program.

Design Contracts Awarded By Fair

ARCHITECTURAL contracts for two buildings, costing $240,000 and $200,000 respectively, were awarded last week by Grover Whalen, chairman of the New York World's Fair Corp., thus inaugurating the main construction program of the exposition.

A Communications Building, to be devoted to house radio, television, telephone and telegraph exhibits, will be designed by Francis Keally and Leonard Dean, both of New York, while Eric Gugler, John B. Slee and Robert H. Bryson, of New York and Brooklyn, will cooperate in the design of a Business Administration Building. Both structures will be of steel frame and wood construction with stucco exteriors. Each will be one-story building with a maximum height of 35 ft. and a minimum height for side aisles of 16 ft.

The construction contracts for the Communications Building are expected to be let in the spring, while the Business Administration Building contracts will not be let until early next winter. Two other major fair structures—the Theme Building and the Administration Building—already are under architectural contract. When these and the two buildings whose designs have just been begun, are completed, they will constitute a typical section of the fair, thus enabling visitors and exhibitors to see actually how the exposition will appear when finished.

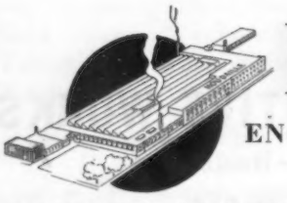
Anodic Process for Magnesium Alloys

AN anodic process for protecting magnesium alloys against corrosion, recently perfected by R. W. Buzzard and J. H. Wilson, metallurgical division, National Bureau of Standards, does not reduce the cross-section materially and gives corrosion-protection and paint-adhesion equivalent to that afforded by the chrome pickling method.

The part to be anodized is first cleaned in an electrolytic bath of sodium carbonate and trisodium phosphate, and is then made the anode in a bath containing 10 per cent of sodium dichromate and from 2 to 5 per cent of monosodium phosphate. The anodic film may be applied over a wide range of current density and temperature, but the most satisfactory results have been obtained with 5 to 10 amp. per sq. ft. at 50 deg. C. Salt spray tests have shown that the anodic film serves both as a corrosion inhibitor and a paint base, it was stated.

Magnesium alloys have a marked susceptibility to corrosive attack under saline conditions and a low degree of adherence of protective mechanical coatings applied to the surface. Previous attempts to improve these conditions by chemical treatment have led to the development of (1) the chrome-pickle treatment, which furnishes good corrosion-protection and is an excellent paint base, but cannot be used on machined parts, as it materially reduces the cross-section, and (2) the alkaline chromate treatment, which can be used on machined surfaces, but has been found to give inferior corrosion-protection. The treatment developed at the bureau apparently combines the desirable features of both processes.

IT may be only a simple piston pin; it may be a refrigerator compression pump; it may be a gun barrel; it may be any one of a thousand-and-one parts or complete mechanisms requiring utmost accuracy, yet *low production costs.* Whatever it is, the chances are Houdaille's highly specialized machinery, specially trained men and common-sense engineers can turn it out to better advantage than your own facilities permit.



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English Steel Output At Record Level

RECORD iron and steel production continues in the British industry, a recent report to the Commerce Department states. This situation, it is pointed out, is of particular benefit to some of the distressed areas, as the higher output is being accompanied by appreciable increases in individual earnings.

In South Wales, as well as in other areas of the United Kingdom, it is confidently expected that when November iron and steel statistics became available they will show a new high level.

A number of important foreign orders were received during the past month and a $15,000,000 contract for the construction and equipment of an iron and steel plant in Turkey was signed on Dec. 1.

Canadian Steel Activity Much Higher

PRODUCTION in Canada of steel ingots and direct castings during the January-October period of this year totaled 912,064 tons compared with 742,720 tons in the corresponding ten-month period of 1935 and 643,137 tons in the first ten months of 1934, according to a report to the Department of Commerce. Pig iron output during the ten months of this year totaled 535,836 tons compared with 464,585 tons and 325,663 tons, respectively, in the corresponding periods of 1935 and 1934.

With increased employment prevailing throughout the Provinces, the availability of funds for home improvements, and generally better business conditions coupled with the prospect of higher prices, it is expected that the primary and secondary iron, steel and hardware industries of Canada will continue to register improvement during the remainder of the current year.

British Firm to Make Colored Aluminum

ANOTINTS, LTD., Birmingham, England, is constructing a plant in which aluminum will be dyed in various permanent colors. Although aluminum has been colored previously, the process to be carried on in Birmingham is said to be new.

The process is electrical, and gives a protective covering to the aluminum which becomes an integral part of the metal, and is not in the form of a deposit as in chromium plating. Aluminum treated by this process becomes insulated against electrical current up to 500 volts, and it will not corrode. Striking colored effects can be obtained by means of the process, and the colors being heat and light resisting are absolutely permanent.

Another British concern, Birmetals, Ltd., Birmingham, has initiated the production of high-tensile aluminum and magnesium alloy sheets. The plant is equipped with the latest type of rolling mill, extrusion presses and electric furnaces, while adjacent to this factory it is proposed to build a large metallurgical and physical laboratory for research work.

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Models Aid in Machine Tool Design

Abstracted from a paper presented by Fred L. Plummer, Associate Professor of Structural Engineering, Case School of Applied Science, before the Dec., 1936, meeting of the American Welding Society, Cleveland section.

THE proper design of any machine or structure requires that we predict what forces will act upon the completed assembly and the conditions under which those forces will be active. It is then necessary that we determine the stresses and distortion which will be created in the structure by the applied forces. Finally, we must select the material and determine the amount and shape of that material, which will most efficiently provide a safe and useful service life for the projected machine or structure. Included in this final step is the selection and design of proper connections, so that the parts of the structure may be assembled and act as a unit.

Early methods of fabrication are largely responsible for a design tradition based on empirical and "rule of thumb" procedures. Newer methods of fabrication, together with the increased use of high strength and light weight metals, make more exact methods of analysis and design essential if our machines and structures are to be economical and at the same time provide satisfactory service records.

The designer of machine tools will find many types of model studies to be of great aid in executing his designs. Three dimensional models built of identical or similar materials may be loaded and tested just as the full scale structure might be tested. Models made of brittle material having a constant stress-strain relationship up to ultimate strength are useful in determining stresses on complicated sections. Rubber models may be used to demonstrate and study distortions. Several useful analogies have been developed which enable the designer to solve stress distribution problems by observation of electrical, hydraulic, or other phenomena.

The photoelastic method is especially valuable to the designer of machines because it enables him to determine and, therefore, avoid the points of stress concentration which have so frequently resulted in fatigue failures of machines which involve reciprocating or rotating parts.

Tennessee Products Corp. Reorganized

REORGANIZATION of the Tennessee Products Corp., Nashville, Tenn., under Section 77-B of the Amendment to the Bankruptcy Act has been completed and the plan accepted by substantially more than the required percentage of each class of bondholders, creditors and stockholders. It is expected that a formal court order will be entered shortly.

In the meantime, necessary funds have been received from the RFC for carrying out new improvements and continuing present business, and the funds are now being disbursed according to the plan of reorganization. Frederic Leake, president, has announced that there are to be certain amounts set aside for the improvement of plants that will enable the corporation to increase the volume of its principal products with more efficient operation. He has further stated that an important announcement may be forthcoming in the near future in connection with new products that the corporation is contemplating manufacturing, the funds for which are available.

During the period of reorganization, Tennessee Products Corp. has continued during the past three years to manufacture at increased capacity the products of its wood distillation plant, such as charcoal, acetic acid, methanol and other heavy chemicals; at its Chattanooga, Tenn., plant, by-product coke, domestic gas and other by-products; at its Wrigley furnace, Lyles-Wrigley, Tenn., semi-cold-blast charcoal iron of both the high phosphorus and low phosphorus types; and at its Gray furnace, Rockdale, Tenn., standard ferrophosphorus.

Bids on Steel Under Walsh-Healey Act

WASHINGTON, Dec. 28.—Without taking exception to the provisions of the Walsh-Healey Government Contracts Act, the Apollo Steel Co. submitted a bid on 1163 tons of sheets for Navy yard stock in connection with a schedule opened last Tuesday. The only other producer to bid was the Youngstown Sheet & Tube Co., which noted exceptions under the act. A bid also was submitted, without exceptions, by a jobber, the Sheet Metal Mfg. Co.

Ludlow-Saylor Wire Co., St. Louis, has announced an improved service in St. Louis for buyers of wire, wire cloth, woven wire screens and other wire products. Facilities previously maintained at the building on Washington Avenue have been transferred to the main group of buildings at Newstead Avenue and the Wabash Railroad, and service accommodations have been provided to give all customers full benefit of complete factory stocks and deliveries.

Whitey Sez:

We are nearing a New Year and resolutions, some will be good and some will be bad, let us hope the good ones are kept and the bad ones broken.

Arc-Welding Electrodes

for welding all corrosion and heat resisting products. Send for data book.

MAURATH INC

MAURATH ELECTRODES IN WORLD WIDE USE

7300 UNION AVENUE·CLEVELAND OHIO

Stainless Steel Used For Wire Spokes

A SUBSTANTIAL increase in the production of stainless steel wire by the wire division of Firth-Sterling Steel Co., McKeesport, Pa., has resulted from the adoption of steering wheels with wire spokes by a number of automobile manufacturers, according to L. Gerald Firth, president.

Since each steering wheel of the most generally used design requires 15 spokes made of a specially treated stainless steel, this division of the company is working full time, Mr. Firth stated.

The new wire spoke steering wheels are designed to reduce road vibration and add to appearance, and since they are unlikely to break in an accident they provide an added safety feature.

Credit Men Told 1937 Will Be Better

HENRY H. HEIMANN, executive manager of the National Association of Credit Men, recently stated in a report to the association's 20,000 members in the banking, manufacturing and wholesaling fields, that "business faces a paradoxical year in 1937. The new year will witness better business conditions and at the same time it will be a more troublesome period for business management."

Continuing his report, Mr. Heimann said that, "the new year will show an improvement over 1936 but the rate of improvement, with the exception of the heavy goods industry, may not make as excellent a comparison with 1936 as that year made with 1935. For the most part the expected improvement can be established because of the presence of the following factors.

"There will continue to be much replacement of needs developed during depression years. There will also be a strong demand for materials to keep abreast of current trends, particularly in the machinery and housing fields. This activity will maintain production in both consumer and durable goods lines at a high rate.

"The improvement in 1936 will be made possible to a considerable extent by the large amount of bank credit which is now abundantly available to those presenting legitimate needs for credit extension. A large share of the improvement in the heavy goods industries will result from this available bank credit.

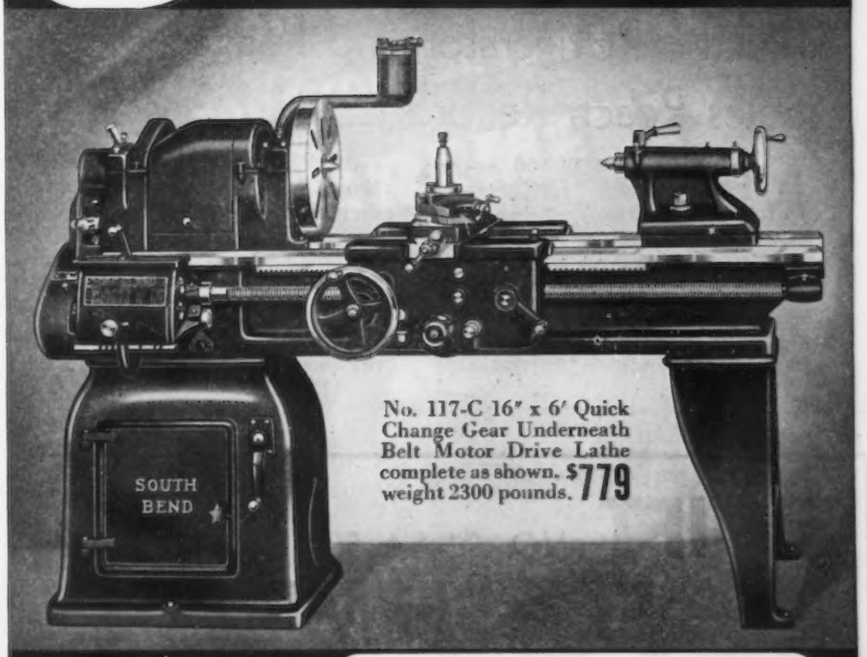
"Besides these favorable factors, however, business will have troublesome situations.

"First, there will be a continuation of labor difficulties.

"Second, rising costs will have their influence upon business earnings. Higher taxes, higher wages and higher material costs are undoubtedly part of the problem of business management during the coming 12 months.

"Third, there will be more business failures during 1937. Recently business failures have been close to a minimum. With the return of confidence, unsound practices by present concerns will cause failure potentialities to rise. There will also be a tendency for new firms to spring up whose possibilities would be based more on hope than on necessity. There has, in addition, been some unsound financing on the part of industry in the closing months of 1936, caused by the operations of the undivided profits tax legislation."

New 1937 SOUTH BEND Precision LATHES



No. 117-C 16" x 6' Quick Change Gear Underneath Belt Motor Drive Lathe complete as shown. $779 weight 2300 pounds.

Write for Catalog No. 96

THE new 1937 Series of Back-Geared, Screw Cutting South Bend Precision Lathes with Double Wall Aprons and hardened and ground headstock spindles are recommended for the finest and most accurate work in the tool room, machine shop, manufacturing plant, and laboratory. Offered in sizes 9" to 16" swing, in bed lengths from 3' to 14', Motor Drive and Countershaft Drive.

Catalog No. 96 shows the new Series "R" South Bend Precision Lathes in all sizes and styles. A valuable book for the shop man, engineer, and plant executive. Sent free, postpaid, upon request.

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o o o

AT the Stevens dinner: Left to right are H. A. Squibbs, assistant general manager of sales, American Steel & Wire Co., Chicago; F. C. Elder, chief metallurgist; W. H. Cordes, sales-promotion- advertising manager, and M. W. Reed, assistant to the vice-president and chief engineer.

o o o

Electric Refrigerator and Range Sales Reach Record Level

MORE than 2,000,000 household electric refrigerators were installed during 1936, establishing another new high record and bringing the total of such refrigerators in use at this time up to approximately 9,000,000, according to R. C. Cosgrove, manager of household refrigerator sales, Westinghouse Electric & Mfg. Co., in a statement at an informal press preview of new Westinghouse products for 1937, held at the Waldorf-Astoria Hotel, Dec. 18.

An even larger volume for 1937 is predicted, the expectation being that something in excess of 2,250,000 electric refrigerators will be installed in American homes during 1937.

Of all electric appliances the electric range was the star performer in 1936, showing the largest percentage of increase, almost 50 per cent over 1935, according to Reese Mills, manager of the range and water heater department of the Westinghouse company. "This appliance has accomplished the astonishing feat of multiplying sales six times in the last three years, and the future holds even greater promise," he said.

More than 300,000 units were sold in 1936, and it is believed that sales next year will be around 420,000 units, and in 1940 probably will approach 1,000,000 units. A large replacement market was said to be looming on the range sales horizon, and there has been a widespread solution of installation cost and other problems that have retarded sales in many communities. The most favorable factor, however, was said to be that the country is becoming increasingly electric minded.

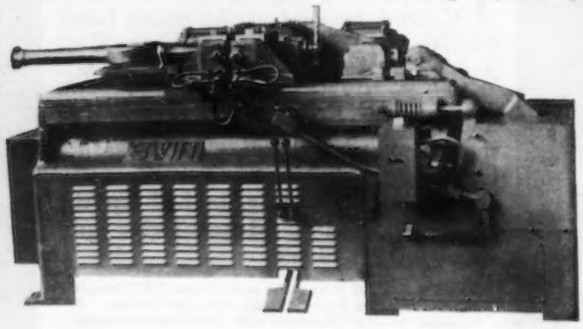
Foresees Record Electrical Appliance Sales

Factors contributing to the company's belief that 1937 will see new records for the manufacture and distribution of electrical appliances were discussed briefly by A. E. Allen, vice-president in charge of all merchandising activities, on the same occasion.

First, the average person has more confidence in the future. Second, there is considerably less unemployment, a factor that helps to instill confidence in the future, both

SWIFT *NO. 91-AA 500 KVA*
FLASH WELDER

Swift No. 91-AA 500 KVA Flash Welder welding forged flanges 3/16" wall thickness to axle housing 5/32" wall thickness. Actual time welding cycle 2 seconds. Takes up 3/16" variation in length of stock and welds to uniform length. Suitable for high speed production welding on parts up to 2½ square inch section.



SWIFT ELECTRIC WELDER CO., 6560 EPWORTH BLVD., DETROIT

Welding machines which are hand, hydraulic, cam or air operated, including the following types: SPOT, SEAM, PROJECTION, FLASH, FLUE, AND GUN WELDING UNITS . . . . . .

on the part of the worker and the manufacturer, he said. Reduction of rates on the part of the utilities was emphasized as one of the greatest of contributing factors.

"With this extremely promising picture for 1937, and with confidence resulting from the most excellent business we enjoyed in 1936, we have just brought out an entirely new line of refrigerators and ranges," said Mr. Allen. "Introduction of these new models represents a very substantial amount of money in re-tooling, research, engineering, time and expense, and other expenditures. We have also just completed a $1,000,000 warehouse and office building that gives us more manufacturing space at our Mansfield plant."

In addition to the extensive new line of "kitchen proved" refrigerators and electric ranges, electrical appliances at the informal press preview included washing machines, five new water heaters and a new window-mounted plug-in room cooler and summer air conditioner for use in homes and in medium size offices. Two electric kitchens equipped with refrigerator, electric range, modern dish-washing facilities, and controlled hot water supply in conjunction with cabinet storage spaces grouped in definite relationship to each other for maximum convenience were striking for completeness, convenience and styling.

Awards Contract for $500,000 Extension

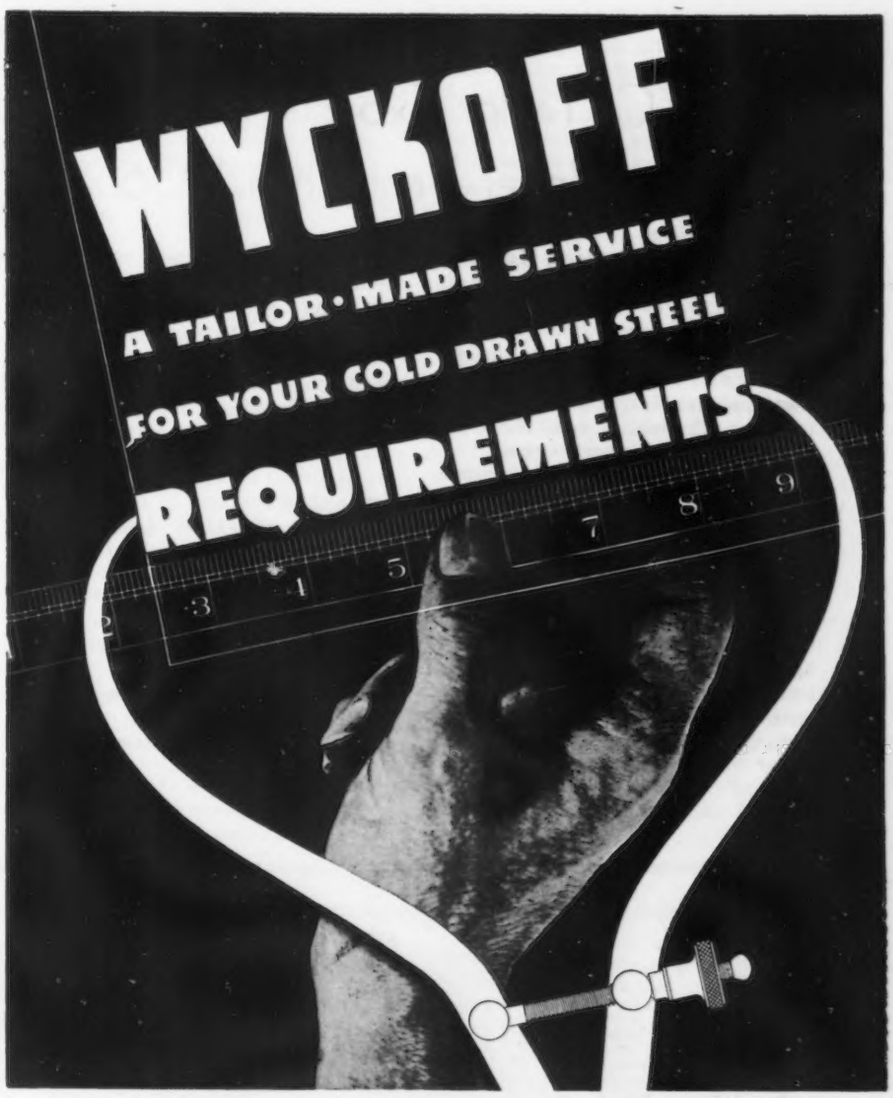
CLEVELAND TWIST DRILL CO., Cleveland, has awarded a contract to the Sam W. Emerson Co., Cleveland, for its recently announced plant extension which will involve an expenditure of from $450,000 to $500,000. The building will have five stories and basement and will be of steel and brick construction. The first three and part of the fourth floors will be used for manufacturing and the remainder of the upper part of the building for offices.

Sees 1937 Gain for Electrical Industry

"THE prospects for the electrical manufacturing industry are very bright," according to A. W. Robertson, chairman of board, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. "Practically all divisions are operating at capacity and orders in sufficient volume are coming to warrant an optimistic view for the next several months. Incoming business is not confined to any one type of product. The demand for household goods is excellent and the public utilities and industry generally are making substantial purchases.

"Notwithstanding many threatening, unpredictable contingencies, there is evidence that we are moving upward along a more or less typical American business curve. The upward swing may continue for considerable time.

"It is now the problem of industry, government and individuals to make certain that the present improvement will be maintained, to the end that business conditions in the future will not be subject to the violent, disastrous fluctuations experienced in the past."



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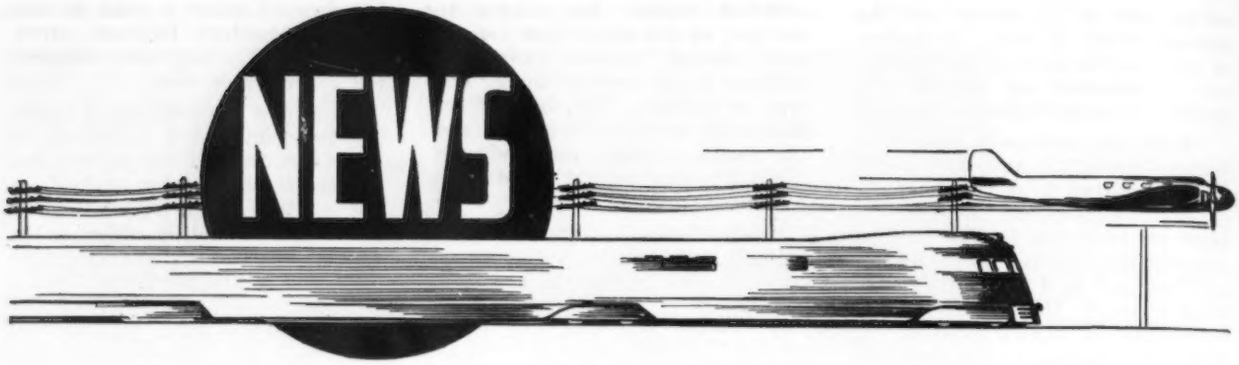

Myron C. Taylor Expects That 1937 Will be a Better Year Than 1936

IN a year-end statement, Myron C. Taylor, chairman of the board, United States Steel Corp., said:

"During the year 1936 the steel industry has seen its perspective of a year ago fully substantiated by what has transpired in the last 12 months. Productive facilities during the year have been engaged at a higher rate than any time since 1929, and as the old year ends the steel industry is operating at a rate approaching 80 per cent of capacity. The most satisfactory feature of this improvement was the steady advancement throughout the year, and it is particularly noteworthy that the political contest exerted no retarding effect on business expansion. This and other significant factors point to a revival predicated upon sound economic principles and actuated by an urgent need for steel.

"The year 1936 has seen the beginning of a large program of betterments, involving expenditure of several hundred million dollars. This program contemplates the provision of production facilities necessitated by changes in mechanical appliances and to supply products of a character demanded by the trade, and for general maintenance of larger proportions arising from deterioration and deferment during the depression period. Completion of these rehabilitation plans, entailing financial investments, will bring into being more efficient and economical units of production, when engaged under satisfactory operating conditions. Modernized facilities, to function with a maximum of effectiveness, must of necessity be kept employed at a level approaching full capacity. To the extent that a continuous flow of business in good volume is not assured, it is unreasonable to expect that such facilities can adequately function for the creation of wealth for the public, who are the owners, or to provide the largest measure of employment for those who are engaged in their operation.

"General commodity price levels have shown an unmistakable upward trend recently. Resultant increased material costs, heavier tax levels and an average 10 per cent increase in steel wage rates recently granted have substantially added to production costs. As a consequence it has been necessary to announce moderate price advances in some lines of steel products to become effective on first quarter business for 1937. It is

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to be observed, however, that these price increases do not apply on all lines of steel manufactures and will not fully offset the increased costs resulting from higher wages, cost of materials and taxes.

"The steel industry enters upon the new year with greater confidence than it has in any year since 1930 and with every indication that it will be a better year than 1936 has been. New business booked by steel mills in the last quarter of 1936 has been in most encouraging volume and is sufficient to enable us to start 1937 in fine fashion. Especially gratifying at the moment are the increasing evidences from the field of railroad transportation that the long pent-up requirements in that field are in substantial measure about to be satisfied.

"We have emerged from the long and difficult battle with adversity during the past six years with our courage, strength of character and resources intact, and we may take a pardonable satisfaction in having weathered the storm with our colors flying. The steel industry cooperated wholeheartedly during those trying years in every sound effort to reestablish the pace of prosperity and to develop and maintain a fair and sympathetic relationship with its workers. As evidence of its sincerity in carrying out this policy, it is to be observed that the steel industry today is giving employment to more men than at any time in its history and its basic rate of pay is at a higher level than ever paid before.

"If we will bring into full play our greatest effort and skill, our vast resources and our constructive ingenuity, submerging self-interest to the interest of the whole nation, we have it within our means to establish an economic and social balance of enduring quality.

New Wire Fence Announced by American Steel & Wire

FIVE years of research work by engineers of the American Steel & Wire Co., culminated on Dec. 16 when the company's All-American Longlife fence was exhibited to selected guests at Hotel Stevens, Chicago. Both the new type of wire and the familiar dull-appearing old type were exhibited in striking contrast at the dinner.

The All-American Longlife fence wire is the result of work carried on under the direction of M. W. Reed, chief engineer, and F. C. Elder, chief metallurgist, of the American Steel & Wire Co., Chicago, in cooperation with technicians of the Tennessee Coal, Iron & Railroad Co., Birmingham, and the Columbia Steel Co., San Francisco.

The new wire, manufactured under a recently patented process, consists of a wire core of full content copper bearing steel, a zinc iron alloy which forms a close chemical bond between zinc and steel, and a heavy outer coating of uniformly applied commercially pure zinc. The All-American fences will be sold, it was announced, under a "guarantee of quality," which guarantees "three-way protection against rust."

The new invention has made necessary the installation of special machinery in plants of the three manufacturing companies. Production was started three months ago and the new fence will be on the market in January. Besides the improvement in appearance due to its luster, the long-life process is said to give rust-protection hitherto impossible.

Sheet & Tube Buys Morgan Mill

YOUNGSTOWN SHEET & TUBE CO. has awarded a contract to the Morgan Engineering Co., Alliance, Ohio, for a new reversing tube mill for its Brier Hill plant. This mill will roll rounds for seamless pipe up to 14 in. in diameter. The new mill is a part of the $10,000,000 improvements recently announced by the Youngstown company.

Japan is currently quite interested in the production of Diesel-powered automobiles. Mitsubishi has been producing only a few bus and truck chassis for Diesel engines, but is now reported to be constructing a new plant to produce about 250 annually. The Ikegai Iron Works and the Niigata Iron Works have also produced a few Diesel engines for motor vehicles, and the Hitachi Engineering Works and the Tokyo Gas and Electric Industry Co. are also interested in this product. Negotiations are now being carried on for the purchase of manufacturing rights of the Diesel-engined vehicle produced by the French Renault Co., and consideration is being given to the purchase of various German Diesel engine designs.

SHEET steel, enamelled, and other products of the metal producing and metal processing industries unostensibly predominate in this modern electrical kitchen, exhibited recently by the Westinghouse Electric & Mfg. Co. at the Waldorf Astoria Hotel, New York. Equipment includes a refrigerator, range, modern dishwashing facilities, controlled hot water heater and other electrical servants arranged with cabinet storage spaces in a manner that saves time and labor. Styling and color make for a pleasing atmosphere, and the use of glass bricks further adds to the decidedly modern motif.

..PERSONALS..

JOHN C. HOPKINS has been elected vice-president and sales manager of Wellman Engineering Co., Cleveland, and will assume his new duties Jan. 1. Mr. Hopkins is widely known in the steel industry. After attending Case School of Applied Science, Cleveland, he was connected with the Penn Iron & Coal Co., Buffalo Union Furnace Co., the former Republic Iron & Steel Co., and Massillon Iron & Steel Co. In 1911 be became affiliated with the American Steel & Wire Co., Central Furnace division, in Cleveland. He held various positions in that company's blast furace plants and was appointed superintendent of the Central furnaces in 1922. He became general superintendent of the company's blast furnaces and steel works in 1929 and served in that capacity until 1934, when he became Cleveland district sales manager of the General Refractories Co., which position he has resigned to join the Wellman organization.

J. C. HOPKINS

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VICTOR E. FLANAGAN has been appointed by the Patterson Foundry & Machine Co., East Liverpool, Ohio, as sales engineer in charge of field work in pulverizing machinery sales. Mr. Flanagan was connected with the mining machinery division of the Allis-Chalmers Mfg. Co. for a number of years and previously had served as general manager of the Diester Concentrator Co., Fort Wayne, Ind., assistant mill superintendent of the New Jersey Zinc Co.'s plant at Ogdensburg, N. J., and as construction engineer for the Replogle Steel Co. He will devote special attention to ball and tube mills and to grinding systems for both wet and dry grinding.

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A. C. WILBY, for a number of years assistant to the president of the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp., has been appointed manager of public relations for the Chicago district for the Carnegie-Illinois Steel Corp. A similar department of public relations has been established in the Pittsburgh district with WILLIAM VOIGT, JR., in charge. Mr. Voigt was Pittsburgh correspondent of the Associated Press before going with the Carnegie-Illinois company.

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L. S. HAMAKER, vice-president and general manager, Berger Mfg. Co., Canton, Ohio, will address the Cleveland chapter of the American Society for Metals, Jan. 4, on the relationship between the metallurgist and the sales department. The meeting will be held at the Cleveland Club.

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WILLIAM REIN has been appointed sales representative in southern Florida for the Magnus Chemical Co., Garwood, N. J.

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J. E. TOBEY, manager, fuel engineering division, Appalachian Coals, Inc., Cincinnati, has been elected chairman of the Ohio Valley section of the American Institute of Mining and Metallurgical Engineers.

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E. C. FELTON, who has been identified since 1918 with the Hunt-Spiller Mfg. Corp., Boston, has been elected vice-president. He joined the company as assistant to the vice-president and later suceeded to the position of assistant treasurer.

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ERNEST M. CLEMENCE, who has had extensive experience in the foundry industry, has been appointed sales manager of the Berlenbach Foundry Co., Quakertown, Pa.

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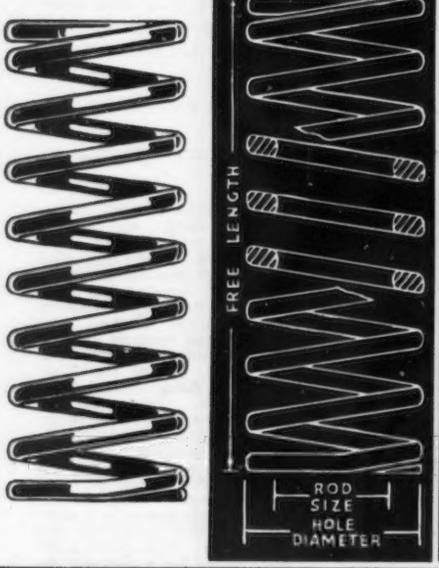
M. O. TROY, manager of the central station department of the General Electric Co., Schenectady, has been elected vice-president. Other commercial vice-presidents elected

Specialists in . . .

DIE SPRINGS



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There are 102 stock sizes on the way to you as soon as your order is received—Parcel Post or Express we always pay the bill. You never used better die springs—try us.

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OFFICE AND FACTORY: LOGANSPORT, INDIANA

include: L. T. BLAISDELL, of Dallas and Southwestern district manager; E. H. GINN, Southeastern district manager, Atlanta; A. L. JONES, Rocky Mountain district manager, Denver, and T. S. KNIGHT, New England district manager, Boston.

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MYRON A. WICK, vice-president of Republic Steel Corp., has been elected president of Truscon Steel Co., Republic subsidiary. Mr. Wick succeeds A. E. WALKER, formerly president of Truscon and general manager of sales for Republic, who has left Republic to become executive vice-president of the Pittsburgh Steel Co.

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HOWARD E. BLOOD, who has been first vice-president of the Borg-Warner Corp., has recently been appointed executive vice-president in charge of operations, with headquarters in Chicago. He will continue as president of the Norge Corp., a position he has held since 1929, and also the presidency of the Detroit Gear & Machine Co. and the Detroit Vapor Stove Co., which Borg-Warner acquired in 1935. For these latter positions his headquarters will remain in Detroit.

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R. B. HOWLAND, heretofore assistant to the president of United Engineers & Constructors, Inc., Philadelphia, has been elected a vice-president of the company.

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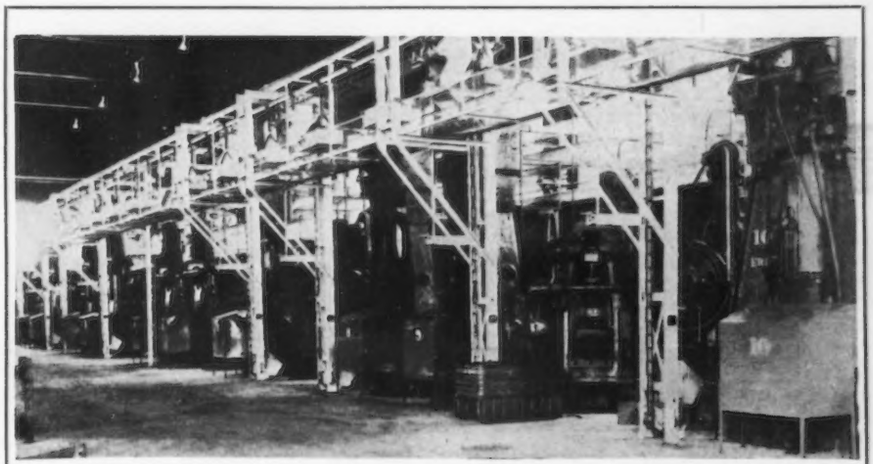
J. M. WATSON has become associated with the Jones & Laughlin Steel Corp. district sales office at Detroit. He is a graduate of the University of Michigan and for

A. E. WALKER, who has resigned from the position of general manager of sales of Republic Steel Corp. to become executive vice-president of the Pittsburgh Steel Co., was the guest of honor Monday evening at a dinner given in Cleveland by his Republic Steel associates. Mr. Walker enters upon his new duties Jan. 1.

M. D. HARBAUGH, whose appointment as executive officer of the Lake Superior Iron Ore Association was announced in these columns last week.



Prepared for Prosperity

Twenty-six ERIE hammers and presses, installed in this shop during the past year, prepare the plant for the peak production predicted.

Have you enough *usable* equipment for the production you expect this year? Now is the time to buy, for prices are rising. Will your equipment stand the gaff of production under steady pressure? These ERIES are built for that, and for power economy, too.

ERIE FOUNDRY COMPANY, ERIE, PENNA., U. S. A.

DETROIT: 335 CURTIS BUILDING
CHICAGO: 549 WASHINGTON BLVD.
INDIANAPOLIS: 335 POSTAL STATION BUILDING
PARIS, FRANCE: 8 RUE DE ROCROY

ERIE

J. M. WATSON

D. J. GREGORY

C. F. CHRISTOPHER

many years has been a metallurgical engineer of the Hupp Motor Car Co., Detroit, and the Sheldon Axle Co., Wilkes-Barre, Pa. He has been active in several technical societies, having served in 1931 as president of the American Society for Metals, and treasurer of that organization in 1928 and 1929. He also served as chairman of the iron and steel division of the Society of Automotive Engineers from 1924 to 1930. Mr. Watson also is a member of the American Society for Testing Materials, and the (British) Iron and Steel Institute.

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D. J. GREGORY, who has had extensive experience in Europe and the United States as a designer of high-speed hydraulic presses, has been made chief engineer of the hydraulic press division of the A. B. Farquhar Co., Ltd., York, Pa. In Europe he was identified with the Krupp plants in Germany and the Putilov Works in Russia. He was formerly identified with the Bethlehem Steel Co., Southwark Foundry & Machine Co., Farrel-Birmingham Co., and the Baldwin-Southwark Corp.

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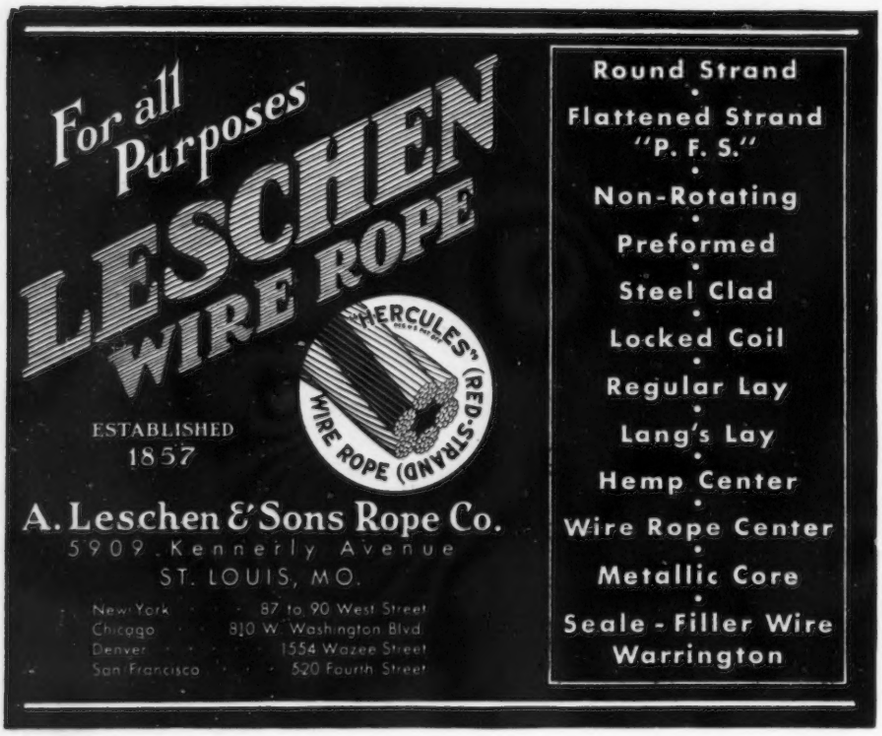
C. F. CHRISTOPHER, for the past two years open-hearth superintendent of the Railway Steel-Spring Division of the American Locomotive Co., has also been made chief metallurgist. From 1923 to 1928 he was employed by the Jones & Laughlin Steel Corp., starting in the inspection department, advancing to the metallurgical department and finally becoming assistant superintendent of one of the open-hearth departments. He resigned in 1928 to become identified with the United States Bureau of Mines, Carnegie Institute of Technology and Metallurgical Advisory Board in charge of open-hearth work under the supervision of C. H. Herty, Jr. Mr. Christopher entered the employ of the Railway Steel-Spring Division in 1934.

R. W. HULL, who has been appointed assistant manager of bar sales division, Republic Steel Corp., as recently announced.



France to Tax Scrap Exports

ADDITIONAL evidence of the growing shortage abroad of raw materials following the inquiries by Japan for pig iron in this country is seen in the recent announcement by France that a penalty of 70 fr. per ton ($3.22) would henceforth be placed upon exports of scrap. Not only has consumption been greatly increased by armament manufacturers due to the competitive situation in Europe today in that industry, but labor conditions throughout the French industrial centers are such that it has become imperative that no shortage of any sort be allowed to develop.

...OBITUARY...

WALTER J. EDMONDS, since 1929 executive vice-president of the International General Electric Co., died of a heart attack at his home in Scarsdale, N. Y., on Dec. 17, aged 47 years. He became identified with the General Electric Co. in 1912 and the International company in 1919. Through a series of promotions he became successively comptroller, financial vice-president and executive vice-president.

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HERMAN H. VEERHUSEN, assistant to Edward R. Stettinius, Jr., chairman of the finance committee of the United States Steel Corp., New York, died in New York after an operation for appendicitis on Dec. 22, aged 46 years. After his graduation from the University of Wisconsin in 1912, he joined the American Telephone & Telegraph Co. During the War, he was engaged on reorganization work for the Red Cross and later went to Tours on a special army assignment. From 1919 to 1922 he was president of the Lithoprint Co. and later returned to the Telephone company. In 1927, he became assistant to the general manager of the General Motors Export Co., and later finance manager of the Far East division, and resigned to become identified with the Solvay Sales Corp. He joined the Steel corporation last year.

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JOHN B. MONAHAN, formerly consulting engineer for the Tennesee Coal, Iron & Railroad Co., died Dec. 19 at his home in Gary, Ind. He was 70 years old. Previous to his consulting work he had been merchant mill superintendent for the Colorado Fuel & Iron Co.

❖ ❖ ❖

PAUL J. NEELY, chief metallurgist, Railway Steel-Spring Division, American Locomotive Co., died at Latrobe, Pa., on Dec. 10. Mr. Neely entered the employ of the Latrobe plant in 1903 as a boy in the chemical laboratory and constantly advanced through his 33 years of employment at this plant until he attained the position of chief metallurgist.

❖ ❖ ❖

WILLIAM C. NORTH, long identified with the bolt and nut industry in Cleveland, died Dec. 23, aged 84 years. He was manager of the former Cleveland Bolt Mfg. Co. and in 1906 was one of the organizers of the Ferry Cap & Set Screw Co., and as the head of this company pioneered in the manufacture of cap screws by the upset process. Harold D. North, his son, is at present president of the Ferry company.

❖ ❖ ❖

HENRY G. PARKHAUSEN, chairman of the board of the Northwest Engineering Co., Green Bay, Wis., died Dec. 22 at the Presbyterian Hospital in Chicago. Mr. Parkhausen was born at Green Bay 52 years ago. He organized the Northwest company and was its president until 1926, when he became chairman of the board.

❖ ❖ ❖

JOHN F. HAWKRIDGE, president of the Hawkridge Brothers Steel Co., Boston, died at his home in Malden, Mass., on Dec. 19. Mr.

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Single, automatic current control which provides easier, faster and superior welding is a patented, exclusive feature of Smootharc Welders... The current setting, shown by a clear reading indicator, is automatically and positively maintained by the Smootharc generator under continuous duty—without further attention by the operator or the manipulation of complicated dual control devices... Only Smootharc Welders have this patented feature of Single Current Control. Investigate and test this outstanding feature. Send for bulletin giving complete information.

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Hawkridge was born at Valley Stream, L. I., 76 years ago and entered the steel business as a boy.

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I. EDWARD BRITT, chief engineer for the Societe Anonyme des Foyer Automatique, Paris, France, died at his home in that city on Nov. 10, aged 43 years. He was born in Virginia, and in 1920 went to Belgium to make a complete powdered coal installation in one of the large steel plants in that country for the Quigley Furnace Specialties Co., New York.

❖ ❖ ❖

HENRY J. BENNETT, secretary of the Superior Charcoal Iron Co., Grand Rapids, Mich., died Dec. 21, after having been in poor health for several years. He had long been associated with the charcoal iron business and was prominent in that industry.

❖ ❖ ❖

JACOB BISHOP PERKINS, who organized the Hill Clutch Machine & Foundry Co., Cleveland, in 1886 and was its president until 1931 when he was succeeded by his son, RALPH PERKINS, died Dec. 27, aged 82 years. He was prominent in civic and other activities in Cleveland.

John Dickinson to Leave Government

WASHINGTON, Dec. 28. — John Dickinson, Assistant Attorney General, in charge of the anti-trust division of the Department of Justice, has resigned, effective Jan. 20, and will return to private practice in Philadelphia as a consultant to law firms in special tasks and to his post as professor in the University of Pennsylvania Law School. His resignation, he stated, was not due to any dissatisfaction with his position or with the anti-trust laws. He resigned, he said, "simply because I have been in Government service for four years and it is my belief that, under our current conditions of business life, it is inadvisable to remain out of direct work in my profession."

His resignation had aroused reports that he was not in accord with the department policy on anti-trust laws. The reports grew out of a recent address Mr. Dickinson made before the Council for Industrial Progress. At that time he suggested the need of more funds to enforce the anti-trust laws. Also he outlined limitations of the laws, pointing out among other things that mere size of a concern does not constitute a violation of the law. He also declared that the anti-trust laws do not outlaw business practices and price policies merely because such policies may operate to make prices relatively rigid or to discourage price wars and market breaks.

Attorney General Cummings, when asked to comment on Mr. Dickinson's address, referred to it as "interesting" and, if he has dissenting views, he did not indicate as much.

Mr. Dickinson's division is handling an investigation relating to so-called "collusive bidding" on steel sheet piling.

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TEST THIS WELDIT GASAVER FREE FOR TWO WEEKS IN YOUR PLANT

..TRADE NOTES..

Shuler Axle Co., Louisville, Ky., has established an office at 6-255 General Motors Building, Detroit.

Republic Steel Corp. has appointed Byrd Plumbers' Supply Co., Cleveland, as a distributer of pipe.

Maas & Waldstein Co., Newark, maker of lacquers and enamels, has appointed Henry R. Jahn, 7 Water Street, New York, as export manager; W. C. Treadwell, 22 Vine Street, Melrose, Mass., as New England representative; and John Dahlquist, 411 Forest Avenue, Jamestown, N. Y., as representative in western New York and northeastern Pennsylvania.

Warner & Swasey Co. has opened an office and warehouse at 409 Velasco Street, Houston, Tex. L. M. Cole is in charge, assisted by J. V. Val.

Manhattan Rubber Mfg. division of Raybestos-Manhattan, Inc., Passaic, N. J., is opening branch office and warehouse at 778 Brannan Street, San Francisco. A. R. Bradshaw is manager.

Electric Quick-Return Units for Millers

THE Porter-Cable Machine Co., Syracuse, N. Y., is marketing an electric quick return for milling machines, particularly those built in the period from 1912 to 1921, and those built since 1921 but having no quick-return provision. Special brackets are employed in mounting. Drive is mounted on feed screw nut and is through gears to a safety clutch on the feed screw. The table may be manually operated from the opposite end.

This Week on the Assembly Line

(CONTINUED FROM PAGE 43)

be around 475,000 units, far in excess of the 418,317 units fabricated in December a year ago.

Despite the heavy purchases of steel during the latter part of November, local steel offices found a decided spurt in the last week. A number of companies, including Fisher Body, made heavy commitments on sheets for shipment during February. There is every indication that many of the large automobile manufacturers are going to cover themselves on their requirements well in advance, so as not to be held up by material shortages, should the labor situation clear up.

A total of 4,565,000 cars and trucks were produced in 1936 in the U. S. and Canada, according to an estimate released by the Automobile Manufacturers Association today. This figure represents an 11 per cent increase over 1935 production. Wholesale value of cars and trucks is estimated at $2,448,925,000, and with tires, accessories, service equipment and replacement parts totals $3,626,612,000. The association reports that 22 per cent of all steel produced was used by the auto industry, 75 per cent of the rubber and 72 per cent of the glass. Motor vehicles registered in the United States as of Dec. 31 are computed at 28,270,000 cars and trucks.

Nash-Kelvinator Corp. came officially into being on Dec. 23 when stockholders of both parent companies ratified the previous action of the two boards. Charles W. Nash will serve as chairman of the board and George W. Mason, Kelvinator's president, will be president of the new organization. The two divisions will continue to operate separately for the present, and no changes are contemplated in personnel.

Jap Machinery Trade Increases

OFFICIAL foreign trade statistics reveal that Japanese machinery imports from 1933 to 1935 increased 45 per cent, while during the same period, exports rose 141 per cent.

The report which was issued by the machinery division, Bureau of Foreign and Domestic Commerce, stated that the leading import classes were metalworking and woodworking machinery, internal combustion engines, steam boilers, textile and sewing machines, card clothing machinery, pumps and compressors, hydraulic presses, steam turbines, papermaking machinery, and rolls and rollers.

The leading groups in the export trade are locomotives, spinning and weaving machines, internal combustion engines, cranes, printing machinery, steam boilers, pumps, and metal and woodworking machinery.

Most of the machinery imported into Japan is supplied by the United States, Germany and the United Kingdom. The United States has enjoyed the largest and an increasing share of this trade in the stated periods, 31 per cent coming from this country in 1933, 37 per cent in 1935, and 40 per cent in the first eight months of 1936.

A large share of the Japanese machinery exports goes to Kwantung and Manchuria, with British India, Asiatic Russia, Netherland India, the Philippine Islands, and Brazil taking most of the remainder.

Heavy Industries Lead Traffic Gain

"FREIGHT loadings have shown two notable tendencies during 1936," says the *Railway Age* in a current editorial. "Total loadings have increased throughout the year at an accelerating rate; and loadings of heavy commodities serving as raw materials for the durable goods industries have increased relatively more than loadings of consumable goods.

"Total loadings in the first half of the year," continues the *Railway Age*, "were 66½ per cent as large as they averaged in the first halves of the five years 1925-1929, inclusive. Total loadings in the 24 weeks ending with December 12 were 71 per cent as large as in 1925-1929—a gain 7 per cent more than seasonal over the first half of the year. In the first two weeks of December they were almost 80 per cent as large as they averaged in 1925-1929.

"In the 24 weeks reported since the middle of the year the increases over 1935 in loadings of the various classes of commodities have been: Merchandise, l.c.l., 5 per cent; grain and grain products, 8 per cent; live stock, 13 per cent; forest products, 19 per cent; miscellaneous, 22 per cent; coal, 23 per cent; coke, 55 per cent; ore, 65 per cent.

"No figures could better illustrate that production in the durable goods is gaining on production in the consumers' goods industries, and that production in the two classes of industries will soon be restored to the equilibrium required for full restoration of prosperity if no measures retarding the progress of recovery in the durable goods industries are adopted."

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Railroads Make More and Spend More Than in Several Years

CONTINUED improvements in both freight and passenger service and increased efficiency in operation, partly the result of widespread scientific research, make the situation of the railroads at the close of 1936 better than at any time since the early years of the depression, says J. J. Pelley, president of the Association of American Railroads, in a year-end statement.

Revenue and traffic, however, have not regained all the ground lost in the depression, he adds. Freight traffic in 1936 measured in loading of revenue freight was greater than in any year since 1931, while the volume of passenger traffic has been larger than in any year since 1930. The net railway operating income of the Class I railroads, while greater than the preceding few years, according to preliminary estimates, was only about three-fourths as large as in 1930 and only about one-half what it was in 1929.

Purchases of new cars and locomotives by the individual lines this year have been greater than in any year since 1930, amounting, according to tentative estimates, to more than $125,000,000 compared with $79,335,000 in 1935 and $92,005,000 in 1934. Capital expenditures for roadway and structures, in the past year, are estimated at $150,000,000 the highest amount for any year since 1931.

Because of increased business, the number of railroad employees increased in 1936 to a point higher than at any time in the past five years. In addition, larger railroad purchases indirectly provided increased employment for thousands of others. Expenditures for supplies and materials used in current operations in 1936 totaled approximately $750,000,000, an increase of more than $150,000,000 above the preceding year and an amount greater than in any year since 1930. As the railroads buy approximately 70,000 different items from paper and pins to locomotives and bridges, these expenditures affected nearly every industry in the nation.

Large Maintenance Increase

Expenditures for maintenance in 1936, according to preliminary estimates, totaled $1,242,000,000 the greatest amount spent in any year since 1931. Compared with 1935, it was an increase of $166,000,000, or 15 per cent. For maintenance of equipment, the railroads in the past 12 months, spent $786,000,000 compared with $681,886,872 in 1935. For maintenance of way and structures, $456,000,000 was spent in 1936 compared with $393,967,260 in the preceding year.

One of the most noteworthy improvements in railway service has been the acceleration of both freight and passenger train movements. The movement of freight trains has been expedited to a point where overnight service is provided between localities as far away as 400 miles. Passenger train schedules have been reduced with a marked saving in time. This speeding up of both passenger and freight service, however, has been made possible only by the many improvements in the mechanical facilities and methods of operation of the railroads.

Revenue freight loadings in 1936 were greater than in any year since 1931, totaling 35,900,000 cars, an increase of 4,340,000 cars or 13.8 per cent above the same period in 1935 and an increase of 5,000,000 cars or 16.2 per cent above 1934, but a reduction of 1,305,000 cars or 3.5 per cent under 1931.

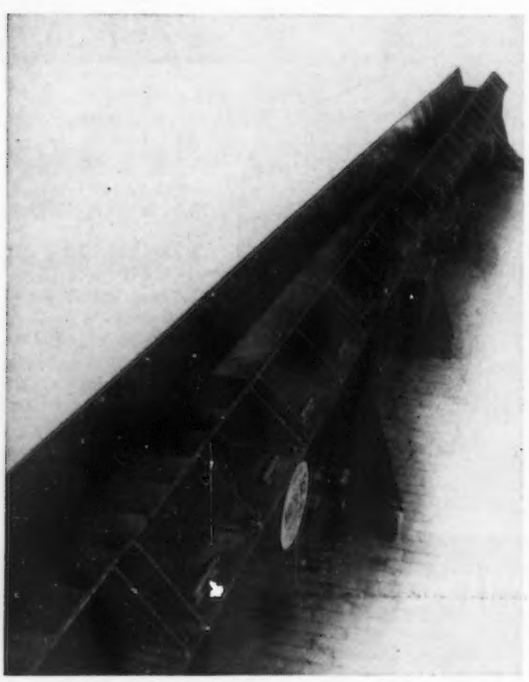
Measured in revenue ton miles, the volume of freight traffic handled totaled 332 billion net ton miles, an increase of 17.7 per cent above 1935 and 23.6 per cent above 1934, but a reduction of 13.4 per cent from 1930.

Passenger traffic in 1936 also exceeded any year since 1930, amounting to 22 billion passenger miles (the number of passengers multiplied by the distance traveled). This was an increase of 19 per cent above the corresponding period in 1935 and 22 per cent above 1934, but a reduction of 18 per cent under 1930.

While complete reports for the year so far are not available, preliminary reports indicate that the railroads will have a net railway operating income in 1936 of 645 million dollars, or a return of 2.51 per cent on their property investment. In 1935, it amounted to $499,819,118 or a return of 1.94 per cent. In 1930, however, the first year of the depression, the same railroads had a net railway operating income of 869 million dollars, which was at the annual return of 3.30 per cent.

Large Gain in Net Income

On the basis of the present trend of business, the Bureau of Railway Economics estimates that after fixed charges have been met, the Class I railroads in 1936 will have a net income of 150 million dollars



FOR special purpose application, the Mathews Conveyor Co., Elwood City, Pa., has designed the hot billet conveyor here illustrated, which has capacity for handling material 2 x 2 in. or 4 x 4 in. square, 6 to 30 ft. long. The conveyor incorporates 4-in. diameter rollers mounted on precision bearings, and is chain driven at a speed of approximately 431 ft. per min.

compared with $7,539,127 in 1935, and with a deficit of $16,887,078 in 1934.

Gross revenues in the past calendar year approximated four billion dollars, an increase of 16 per cent above 1935 and 22 per cent above 1934, but a reduction of 24 per cent under 1930. Operating expenses are expected to total approximately $2,925,000,000 in 1936, an increase of 12.8 per cent above the preceding year and 20 per cent above two years ago, but a reduction of 26 per cent under 1930.

Class I railroads, in the past 12 months, installed approximately 41,700 new freight cars, a greater number than has been placed in service in any year since 1930. At the same time, they also installed 80 new steam locomotives and 37 new electric and Diesel-electric locomotives compared with 40 new steam locomotives and 102 new electric and Diesel-electric locomotives placed in service in 1934.

The number of new freight cars on order is now approximately 16,500 cars, a greater number on order at this season of the year than in any corresponding period since 1929. The railroads also have approximately 109 new steam locomotives on order, a greater number for this time of year than in any year since 1931.

Repaying Loans

The railroads are making progress in repaying the loans made to them by the Federal Government and also by the Railroad Credit Corp., which is an organization set up by the railroads themselves to assist needy carriers. Of loans totaling $516,206,000 so far disbursed by the Reconstruction Finance Corp., the railroads have repaid $171,016,000, leaving $345,190,000 in outstanding loans made by that corporation. Repayments made by the railroads in 1936 to this Federal agency totaled $80,049,000, the greatest amount repaid by the railroads in any calendar year since the Reconstruction Finance Corp. was organized.

In addition, the railroads have repaid a large part of the loans for new equipment, new rail and maintenance work made in 1933 and 1934, by the Public Works Administration as a measure of unemployment relief in the heavy industries. Railway loans made for that purpose totaled $200,824,500, of which amount $25,419,000 has been repaid, leaving $175,405,500 outstanding.

Besides the loans repaid, many of the securities representing Government loans, have been sold to the investing public, by the Reconstruction Finance Corp. and the Public Works Administration, so that the amount of railroad loans held by Government agencies as of Nov. 30, was reduced to $417,261,890.

Approximately 65 per cent of the loans made by the Railroad Credit Corp. to various railroads to enable them to meet their fixed charges have also been repaid, the total now outstanding as of Dec. 15, 1936, being $25,908,875 compared with $73,691,368 originally loaned.

Railroads to Press New Rate Structure

WASHINGTON, Dec. 28 — In accordance with the recent decision of the Interstate Commerce Commission, the emergency freight surcharges on steel, pig iron, ore, coal and other materials will not be levied after midnight Dec. 31. Meanwhile, the railroads will soon press their appeal to the commission for an upward revision of the basic freight rate structure, which would give them **$50,000,000** or more of increased freight revenue, based on the 1936 volume of traffic, as compared with about $120,000,000 they derived from the emergency rates.

The present emergency charge on steel and scrap is 2c. per 100-lb. The maximum surcharge on pig iron is 25c. per gross ton. The maximum surcharge on coal and coke is 10c. per ton while the maximum surcharge on iron ore is 8c. per net ton.

The proposed readjustment of the basic rate structure provides for an increase of 10 per cent in iron and steel commodity rates with a maximum of 1c. per 100-lb., or 20c. per net or gross ton, as rated, with an increase of 1c. per 100-lb. in column rates. On scrap iron and steel it is proposed to increase commodity rates 20 per cent with a maximum of 20c. per ton within western territory. In other territories commodities rates on scrap would be increased 10 per cent with a maximum of 1c. per 100 lb. Also the column rating of 12½ per cent at a minimum weight of 50,000 lb., would be canceled at the 75,000-lb. minimum on scrap in western territory.

On Lake iron ore the rate from mine to port would be increased 5c. per net or 6c. per gross ton. Where there is rail transportation beyond Lake ports these rates would be increased similarly to the mine-port rate advances and would likewise include the same increases in local rates. The 40c. iron ore rate in Alabama would be increased to 50c. per ton.

On coal and coke the rates would be increased 3c. per ton where they range up to 75c. and scale up to 11c. per gross ton additional where they are $1. All proposed increases would be based on rates prior to the addition of surcharges.

NOPAK VALVES

An air leak equal to 1/16" diameter hole costs $28.00 per month. Air is expensive, control it efficiently and accurately with a NOPAK valve —a patented leak-proof valve guaranteed to stay tight without maintenance. Its flat, patented disc together with a packless spindle prevents sticking and assures you of many years of leak-proof operation. Permits throttling or quick opening. Easy to operate. Seat protected at all times and cannot wear out. NOPAK valves are suitable for air, gas, water, or oil. *Write for Bulletins.*

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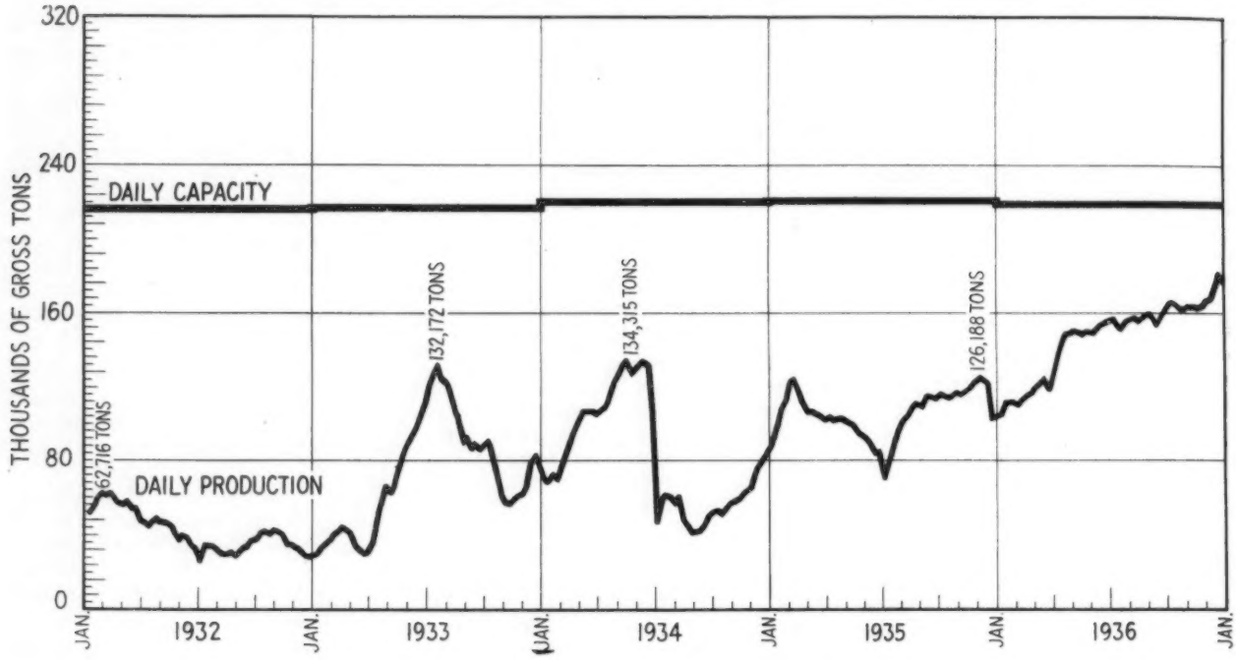
STEEL INGOT PRODUCTION

Daily Tonnage of Bessemer and Open-Hearth Steel Ingots Produced by Weeks, 1932-1936

Current Week	Last Week	Weeks Ended Jan. 4, 1936	Jan. 5, 1935	Jan. 6, 1934	Jan. 7, 1933
174,431	171,189	105,176	90,769	68,259	30,335



Figures for the current week are not indicated on the chart until the following week.

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

District	Current Week	Last Week	Weeks Ended Dec. 5, 1936	Jan. 4, 1936	Jan. 5, 1935
Pittsburgh	78.0	78.0	72.0	35.0	25.0
Chicago	77.5	70.0	77.0	47.0	45.0
Valleys	84.0	84.0	78.0	59.0	50.0
Philadelphia	56.5	56.5	54.5	34.0	27.0
Cleveland	77.0	76.0	76.0	52.0	65.0
Buffalo	84.0	84.0	84.0	40.0	41.0
Wheeling	94.0	93.0	94.0	68.0	80.0
Southern	69.5	69.5	69.5	50.0	29.0
Ohio River	95.5	95.5	95.0	82.0	60.0
Western	76.5	76.5	59.0	40.0	25.0
St. Louis	75.0	75.0	69.0	66.0	30.0
Detroit	100.0	100.0	100.0	95.0	66.0
Eastern	85.0	85.0	85.0	40.0	30.0
Aggregate	79.5	78.0	76.0	47.5	41.0
Average Year to Date	67.3	67.1	66.4	48.2	37.1

Weekly Booking of Construction Steel

From THE IRON AGE

	Week Ended Dec. 28, 1936	Dec. 21, 1936	Dec. 1, 1936	Dec. 30, 1935	Year to Date 1936	1935
Fabricated structural steel awards	28,875	23,855	25,210	20,000	1,070,255	808,470
Fabricated plate awards	11,970	175	415	15,235	214,275	184,420
Steel sheet piling awards	0	2,355	1,195	0	56,315	66,205
Reinforcing bar awards	2,515	4,095	4,200	5,600	329,190	321,790
Total Lettings of Construction Steel	43,360	30,480	31,020	41,835	1,670,035	1,380,885

. . . . SUMMARY OF THE WEEK. . . .

. . . Heavy buying has subsided, but mills have large first quarter backlogs.

° ° °

. . . Important sheet producer withdraws from market; others well filled.

° ° °

. . . Pig iron prices advanced 50c. in some centers; steel scrap higher.

WITH the withdrawal of fourth quarter price protection, the heavy buying of the past several weeks has subsided, but steel mills will enter the new year with large backlogs, sufficient in some instances to carry through the first quarter at undiminished operating rates. Unfilled orders for sheets are in record-breaking volume, with new sales at the higher quotations being freely made for March delivery. One large sheet producer has withdrawn from the market for first quarter at any price.

New steel bookings in the past week were heaviest in bars, plates and shapes required for identified construction projects, including railroad equipment, on which the mills placed a Dec. 31 deadline. Contractors who have secured protection at the old prices will be required to enter into definite contracts prior to Jan. 31, with specifications to be completed by March 31. This means that considerable of such business will appear in second quarter rolling schedules.

Steel ingot production for this week is estimated at 79½ per cent, indicating full recovery from the Christmas holidays, which caused some facilities to shut down Saturday as well as Friday. There will be no interruption this week because of New Year's Day.

Barring labor disturbances in the automobile industry, which already have caused some holdups of steel shipments, there is every reason to expect that the steel industry will operate ingot producing facilities at very close to 80 per cent through the new quarter. The fact that demand upon bessemer producing capacity is not as heavy as upon open-hearth capacity is one reason why operations do not go higher under existing pressure for steel, but a more important factor is the continued shortage of coke and pig iron. Rising prices for steel scrap are again forcing steel plants to resort to the greatest possible use of pig iron, but there is a limitation to such procedure owing to insufficient blast furnace capacity at some points and the possibility that some furnaces now active may have to be blown out for relining.

An actual shortage of pig iron during the first quarter is not improbable, as integrated steel companies have less for the market and demand falls more heavily on merchant producers. Furnaces at Pittsburgh and in Eastern Pennsylvania have advanced pig iron prices 50c. a ton, effective Jan. 1.

WHILE speculative buying of both steel and pig iron has been more apparent in the past two weeks than in the preceding several weeks of this buying movement, the situation is not alarming to producers because it is apparent that material is being consumed almost as soon as it is received. Some building up of pig iron stocks has occurred, but it is virtually impossible for steel users to get very far ahead, as is evidenced by the fact that pressure for deliveries has not lessened but has increased. Some jobbers are unable to fill orders immediately, particularly in sheets, as consumers turn to them to supply material that cannot be obtained promptly from the mills.

The settlement of two of the major strikes affecting automobile parts production leaves the glass situation as the most threatening disturbance. Some automobile makers have large stocks of glass, but others may be affected in their assembly lines before long if fresh supplies are not forthcoming.

Year-end developments in the railroad equipment field include the purchase of 1100 freight cars by the Norfolk & Western, 1050 by the Elgin, Joliet & Eastern and 700 by the Western Pacific. The Great Northern will buy 1050 and the Burlington will build 3550 cars and 10 locomotives in its own shops. Railroad repair work on a large scale to be undertaken in 1937 will give considerable additional business to steel mills.

ALTHOUGH the holidays checked activity in scrap, the trend was still strongly upward wherever transactions occurred. Reflecting the steel price changes effective Jan. 1, the composite price for finished steel is 2.33c. Pig iron price changes effective Jan. 1 will be shown in the next issue.

. . . PITTSBURGH . . .

. . . Ingot production in district 78 per cent, unchanged; higher at Wheeling.

o o o

. . . Sheet mills swamped with heaviest unfilled tonnage in years.

o o o

. . . Pig iron prices advanced 50c. a ton, effective Jan. 1.

PITTSBURGH, Dec. 28. — Steel ingot production in the Pittsburgh district is unchanged at 78 per cent of capacity, while the Wheeling district is up 1 point to 94 per cent of capacity. Producers will have to make up some of the time lost during Christmas shutdowns, although it is notable that many plants took iron on Christmas afternoon and were tapping heats last Saturday morning. Little change in the operating rate in the Pittsburgh district is expected during the next month, as most producers are working at practical capacity.

Reflecting the current tight situation, all grades of pig iron will be advanced 50c. a ton, effective Jan. 1. Some makers may be able to take additional orders at present prices, but so far as possible these will be subject to shipment before the end of the year. Heavy consumption has resulted in drastic depletion of inventories and an active market is looked for during the first quarter.

Mills are definitely out of the market at fourth quarter steel prices, with the possible exception of heavy plates and shapes, most of which will be booked in connection with identified projects. Shipments of semi-finished steel are exceptionally heavy and, with a high rate of finished steel consumption, it is apparent that some non-integrated makers were not able to adequately forecast their future requirements. Buyers of cold-finished bars are making a last-minute effort to get under the wire before new prices become effective on Jan. 1. Heavy specifying by jobbers is in progress.

Following the Christmas holiday shutdown, tin plate operations have rebounded to about 95 per cent. Sheet mills are swamped in their attempt to get out the heaviest backlog of unfilled tonnage in years.

No change has taken place in the strong beehive coke market, and producers are having difficulty in filling spot orders owing to the conservation of standard coke for furnace contracts.

Pig Iron

Reflecting the current tight situation, all grades of pig iron will be advanced 50c. a ton, effective Jan. 1. There is little chance that much covering can be done at the present prices, owing to the fact that producers have their hands full to make deliveries on orders already booked. Some makers may be able to take additional orders at present prices, but these will be subject to shipment before the end of the year. Merchant producers in this district are operating at full blast and have pared down their inventories considerably in order to keep up with heavy consumptive demand. The price advance will find most customers with very little stocks. An active pig iron market may be looked for during the first quarter, owing to withdrawal of integrated mills which formerly catered to the merchant trade. Practically all of this business must be supplied by merchant producers, who already have their hands full. Another factor to be reckoned with in case steel operations continue around present levels is a shortage of steel-making iron at steel plants whose facilities are unable to supply the heavy demand.

Semi-Finished Steel

Every producer of semi-finished steel is definitely out of the market at fourth quarter prices. Tonnages booked so far in December show the largest total in several years. While a large portion of specifications booked were to avoid the price advance, heavy consumption of finished products indicates that some customers were unable to estimate correctly their future requirements.

Bolts, Nuts and Rivets

Bookings are up sharply as contract customers continue to anticipate price advances. Orders are emanating from every source, with automobile companies and railroads placing substantial tonnages. Miscellaneous customers have been specifying freely for the past several weeks. Backlogs at producers plants will keep production at breakneck pace through January.

Bars

Specifications in some cases aggregate three times those placed in November and represent the heaviest volume of bookings since predepression days. Full rolling mill schedules are assured through January, and, owing to the heavy consumption of steel, considerable pressure will be exerted for delivery. Customers who have not specified in advance or have not correctly gaged their future requirements are realizing that a sellers' market exists. Adding to the difficulty in getting fourth quarter price shipments out before the end of January are concrete bar specifications placed previous to Dec. 23, when a higher price went into effect. Labor difficulties in the automobile industry will, of course, have an effect on releases from that source.

Reinforcing Bars

A mild movement to enter specifications before the price advance, effective Dec. 23, occurred last week. The advance has driven in considerable tonnage for identified projects as contractors have only until Jan. 15 to place definite commitments. There has been no disposition for steel producers to load up their mills at the lower quotations, and, owing to the heavy bar backlogs, it is expected that the firming up of concrete bar prices will continue.

Tin Plate

Following the Christmas holiday shutdown, tin mill operations have rebounded and are now at about 95 per cent. Backlogs are substantial and a considerable portion of tonnage being rolled at this time is for 1937 packers' specifications.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous; Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Dec. 28, 1936	Dec. 21, 1936	Dec. 1, 1936	Dec. 30, 1935
Rails, heavy, at mill	$39.00	$39.00	$39.00	$36.37½
Light rails, Pittsburgh	**38.00**	35.00	35.00	35.00
Rerolling billets, Pittsburgh	**34.00**	32.00	32.00	29.00
Sheet bars, Pittsburgh	**34.00**	32.00	32.00	30.00
Slabs, Pittsburgh	**34.00**	32.00	32.00	29.00
Forging billets, Pittsburgh	**40.00**	39.00	39.00	35.00
Wire rods, Nos. 4 and 5, P'gh	43.00	43.00	43.00	40.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.80	1.80	1.80	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	**2.20**	2.05	2.05	1.85
Bars, Chicago	**2.25**	2.10	2.10	1.90
Bars, Cleveland	**2.25**	2.10	2.10	1.90
Bars, New York	**2.55**	2.40	2.40	2.20
Plates, Pittsburgh	**2.05**	1.90	1.90	1.80
Plates, Chicago	**2.10**	1.95	1.95	1.85
Plates, New York	**2.34**	2.19	2.19	2.09
Structural shapes, P'gh	**2.05**	1.90	1.90	1.80
Structural shapes, Chicago	**2.10**	1.95	1.95	1.85
Structural shapes, New York	**2.31¼**	2.16¼	2.16¼	2.06¼
Cold-finished bars, P'gh	**2.55**	2.35	2.35	1.95
Hot-rolled strips, P'gh	2.15	2.15	1.95	1.85
Cold-rolled strips, P'gh	2.85	2.85	2.60	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.80	2.80	2.80	2.40
Hot-rolled annealed sheets, No. 24, Gary	2.90	2.90	2.90	2.50
Sheets, galv., No. 24, P'gh	3.40	3.40	3.40	3.10
Sheets, galv., No. 24, Gary	3.50	3.50	3.50	3.20
Hot-rolled sheets, No. 10, Pittsburgh	2.15	2.15	2.15	1.85
Hot-rolled sheets, No. 10, Gary	2.25	2.25	2.25	1.95
Cold-rolled sheets, No. 20, Pittsburgh	3.25	3.25	3.25	2.95
Cold-rolled sheets, No. 20, Gary	3.35	3.35	3.35	3.05
Wire nails, Pittsburgh	2.25	2.25	2.25	2.40
Wire nails, Chicago dist. mill	2.30	2.30	2.30	2.45
Plain wire, Pittsburgh	2.60	2.60	2.60	2.30
Plain wire, Chicago dist. mill	2.65	2.65	2.65	2.35
Barbed wire, galv., P'gh	2.70	2.70	2.70	2.80
Barbed wire, galv., Chicago dist. mill	2.75	2.75	2.75	2.85
Tin plate, 100 lb. box, P'gh	*$4.85	$5.25	$5.25	$5.25

*Practically the equivalent of previous quotation owing to new method of quoting effective Jan. 1, 1937.

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:	Dec. 28, 1936	Dec. 21, 1936	Dec. 1, 1936	Dec. 30, 1935
No. 2 fdy., Philadelphia	$22.3132	$22.3132	$22.3132	$21.3132
No. 2, Valley furnace	20.50	20.50	20.50	19.50
No. 2, Southern Cin'ti	20.44	20.44	20.44	20.2007
No. 2, Birmingham†	16.88	16.88	16.88	15.50
No. 2, foundry, Chicago*	20.50	20.50	20.50	19.50
Basic, del'd eastern Pa.	21.8132	21.8132	21.8132	20.8132
Basic, Valley furnace	20.00	20.00	20.00	19.00
Malleable, Chicago*	20.50	20.50	20.50	19.50
Malleable, Valley	20.50	20.50	20.50	19.50
L. S. charcoal, Chicago	26.2528	26.2528	26.2528	25.2528
Ferromanganese, seab'd carlots	80.00	80.00	75.00	85.00

†This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$19.25	$19.25	$17.25	$14.25
Heavy melting steel, Phila.	16.25	16.25	14.75	12.50
Heavy melting steel, Ch'go	17.75	17.75	16.50	13.25
Carwheels, Chicago	18.00	18.00	17.00	13.25
Carwheels, Philadelphia	17.25	17.25	16.75	13.00
No. 1 cast, Pittsburgh	17.25	17.25	16.25	14.25
No. 1 cast, Philadelphia	17.25	17.25	16.75	13.00
No. 1 cast, Ch'go (net ton)	**15.50**	15.00	14.50	12.00
No. 1 RR. wrot., Phila.	15.75	15.75	15.75	12.25
No. 1 RR, wrot., Ch'go (net)	**16.50**	15.00	14.25	11.00

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.00	$4.00	$3.75	$3.65
Foundry coke, prompt	4.50	4.50	4.25	4.25

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	**11.62½**	11.00	10.50	9.00
Lake copper, New York	**11.75**	11.12½	10.62½	9.37½
Tin (Straits), New York	**52.25**	52.00	51.37½	48.62½
Zinc, East St. Louis	5.45	5.45	5.05	4.85
Zinc, New York	5.82½	5.82½	5.42½	5.22½
Lead, St. Louis	5.85	5.85	5.05	4.35
Lead, New York	6.00	6.00	5.20	4.50
Antimony (Asiatic), N. Y.	**13.25**	12.62½	12.50	14.50

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Dec. 28, 1936	2.330c. a Lb.	$19.73 a Gross Ton	$17.75 a Gross Ton
One week ago	2.274c.	19.73	17.75
One month ago	2.197c.	19.73	16.17
One year ago	2.130c.	18.84	13.33

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products represent 85 per cent of the United States output.

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low	High	Low	High	Low
1936	2.330c., Dec. 28	2.084c., Mar. 10	$19.73, Nov. 24	$18.73, Aug. 11	$17.75, Dec. 21	$12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, April 23
1934	2.199c., April 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Packers are prone to be liberal in their forward bookings owing to the crop outlook and a possibility of labor disturbances later on in the year. No falling off in general line can specifications has occurred.

Cold-Finished Bars

Specifications booked during December are the best on record for several years. The volume of orders placed in the past week by jobbers, to escape the price advance which becomes effective Jan. 1, has been exceptionally heavy. While a large percentage of orders booked in December came from the automotive industry and farm implement manufacturers, a heavy volume of specifications was received from miscellaneous sources, especially manufacturers of electrical appliances. Should labor difficulties result in shutdowns in the automobile industry, shipments of cold-finished material will, of course, be affected. Meanwhile, some non-integrated makers are still experiencing difficulty in obtaining hot bar stock in order to keep up with fabricating schedules.

Steel Sheet Piling

Demand has been affected somewhat by the holidays. Appropriations for a bulkhead at Flushing Bay, New York, involving 1800 tons of piling, are insufficient to cover the cost of the project and as a result no awards will be made until more money is obtained.

Plates and Shapes

Demand for heavy plates and shapes both from miscellaneous sources and specified building projects continues in good volume. December tonnages will be close to twice the amount booked in November. Indicative of more business to come from utility companies is the awarding of a contract for a power plant extension involving 1750 tons to the American Bridge Co. by the Williamsburg Power Plant Corp., Brooklyn. American Bridge also received an award of 2350 tons for section No. 7 of the Sixth Avenue subway, New York.

Sheets

Backlogs are at the highest point in several years and mills are being pressed to make up for time lost during the holiday shutdown. A small amount of business at new prices continues to be booked and there is a growing possibility that many fill-in orders will be placed in January. Although no serious hold-ups have occurred as yet on material consigned to the automobile manufacturers, should labor difficulties seriously interfere with their production schedules, mill releases will be immediately affected. Meanwhile, shipments to tractor and implement makers and miscellaneous sources are in heavy volume.

Strip

Some orders are being placed at the new prices but for the most part represent fill-in requirements on certain sizes and grades. Backlogs are the heaviest in years and finishing mills will be scheduled at capacity throughout January.

Wire Products

Despite the fact that exceptionally heavy backlogs exist at producers' plants, fresh orders for manufacturers' wire continue brisk. While specifications for merchant wire items are not keeping pace with other wire products, orders on the whole are beyond the expectations of producers.

Tubular Products

The closing of sales offices from last Thursday noon until Monday morning has had their effect on pipe specifications. However, on a day to day basis, this market continues to show marked steadiness. Improvement in orders for boiler tubes, emanating from both railroad repair shops and locomotive builders, continues unabated. The usual year-end slump in pipe specifications is not nearly as pronounced this year as in former years. Owing to the certainty of an increase in building projects early in 1937, no falling off is expected in the steady buying of standard pipe. Improvement in the country's oil business presages an even better volume of orders for oil-country goods than has been booked in 1936.

Coal and Coke

Orders for domestic beehive coke have picked up in the past week. The situation in spot furnace coke remains tight because of the holiday shutdown last week, which not only caused the conservation of all available tonnage for furnace contracts but will mean that producers must step up their production this week in order to catch up with blast furnace demands. Coal production continues at virtual capacity owing to industrial consumption and disposition of customers to stock up in anticipation of labor trouble later in the year.

Norfolk & Western has ordered 1000 55-ton hopper coal cars from Virginia Bridge Co., and has placed an additional order with Greenville Car Co. for 100 50-ft. cars similar to 100 cars just completed by that company.

Western Pacific has ordered 200 box cars from Mount Vernon Car Mfg. Co., and 500 flat cars from American Car & Foundry Co.

Elgin, Joliet & Eastern has placed 400 gondola cars with Mount Vernon Car Mfg. Co.; 250 gondola cars with General American Car Co., 200 dump cars with American Car & Foundry Co., 100 gondola cars with Ralston Steel Car Co., and 100 gondola cars with Greenville Car Co.

Great Northern has applied for authority to issue $4,650,000 in equipment trust certificates to aid in financing purchase of 1000 50-ton box; 50 75-ton ore, 500 50-ton gondola cars and 12 passenger coaches. Contract for the ore cars has been placed with Bethlehem Steel Co. Awards for the remaining equipment have not been placed. Total cost will be $6,210,000.

Chicago, Burlington & Quincy has applied for authority to issue $7,080,000 in equipment trust certificates to finance purchases costing $8,861,300. Equipment to be bought consists of 1000 50-ton single-sheathed steel frame box cars, 250 50-ton single-sheathed steel frame automobile cars, 250 55-ton hopper cars, 1500 50-ton composite gondola cars, 10 steam locomotives, 100 50-ton steel underframe flat cars, 150 40-ton steel frame stock cars, 270 40-ton refrigerator cars and 30 50-ft. refrigerator cars. Refrigerator cars will be built by Burlington Refrigerator Express Co., a subsidiary, at its shops in Plattsmouth, Neb. Locomotives and other cars also will be built in carrier's own shops.

American Car & Foundry Motors Co. has received an order from Pittsburgh Motor Coach Co., Pittsburgh, for 25 motor coaches.

Class I Railroads of the United States had more new freight cars and steam locomotives on order Dec. 1, this year, than on any corresponding date since 1929, J. J. Pelley, president of the Association of American Railroads, has announced. New freight cars of all classes on order Dec. 1, totaled 19,844 compared with 4490 Dec. 1, 1935, and 1771 Dec. 1, 1934. The number of new freight cars on order Dec. 1, 1929, was 30,569. New steam locomotives on order Dec. 1, totaled 111. At the same time there were five new electric and diesel locomotives on order. On the same date one year ago, 14 new steam locomotives and three new electric locomotives were on order, while on Dec. 1, 1934, there were 23 new steam locomotives and 95 new electric locomotives on order. The number of new steam locomotives on order Dec. 1, 1929, was 299. Class I railroads in the first 11 months of this year placed 39,556 new freight cars and 77 locomotives in service.

Federal Judge Moore has approved program of the Missouri Pacific, published in THE IRON AGE of Dec. 24, page 78, minus $474,000 for locomotives which was eliminated by the railroad in an amended application.

. . . . CHICAGO . . . .

. . . Ingot production rate, after holiday letdown, rises to 77½ per cent.

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. . . No indications of a recession in the heavy demand for steel.

o o o

. . . Pig iron prices to be advanced 50c a ton, effective Jau. 1; scrap higher.

CHICAGO, Dec. 28.—With the holiday out of the way, ingot production has climbed 7½ points to 77½ per cent of capacity, which is the mark at which it stood two weeks ago. There are no indications of a recession in the demand for steel in the early part of the new year, and thereby another precedent of long years' standing is broken. In fact, instead of a New Year's drop in demand, it is conceivable that pressure will increase.

The speculative side of the market is growing in intensity and underlying this attitude is the constant threat of higher prices. Pig iron will be marked up 50c. a ton, effective Jan. 1, for first quarter delivery. Scrap quotations are advancing 50c. to $1 a ton, and not a weak factor is discernible in that market. The only saving in sight in so far as consumers are concerned is the dropping of railroad surcharges Jan. 1.

Among new locomotive inquiries are two engines for the Chicago & Illinois Midland. Purchase of car materials is an important factor in bringing finished steel buying to a point very close to the best of 1936.

Pig Iron

Producers will announce new prices effective Jan. 1 for deliveries during the first quarter. The upward swing amounts to 50c. a ton, bringing No. 2 foundry iron to $21 a ton, f.o.b. Chicago. The few days remaining in December are expected to bring a flood of new orders to books which are already heavy.

Bars

An astonishing phase of this market is that releases are increasing at the holiday period when in normal years consumers' wants diminish. There is no doubt that acceptances are in excess of actual requirements and the underlying reasons are deliveries, strength of prices, and, last but not least, the threatening cloud of labor disturbances. In previous periods of speculative buying mills could appraise the move by consumers' willingness, in fact insistence, that shipments be held closely to actual requirements. Now, however, consumers give no hint of holding back and will take just about all that mills can apportion to them. Deliveries range from three to four weeks.

Plates

Railroad equipment business is still the dominant factor in this market. The Elgin, Joliet & Eastern has placed 1050 cars with five builders. The Burlington is going ahead with a large shop program which calls for building both cars and locomotives. Mills report excellent releases from car builders and railroad shops, and tonnages from these sources are expected to grow in the early part of the new year. Tank fabricators report more business in sight and their hopes are raised considerably for the early part of 1937.

Structural Material

Inquiries are at a better level, but awards are slow considering that the end of the protective period is in sight. Lock No. 26 at Alton, Ill., on which the contractor failed to perform, but for which all material had been fabricated and delivered, is now in the hands of the American Bridge Co. which will erect the job.

Rails

Several railroads which had taken options are now exercising them and consequently mill bookings continue to grow. Schedules are well arranged for the next six to eight weeks at about 50 per cent of capacity. Track accessories are being produced in accordance with rail rollings.

Cold-Rolled Strip

Mills are closing 1936 with an all-time record production. Most units are practically sold out for the entire first quarter.

Wire Products

New orders are heavy, and many wire mill departments are sold out for the first quarter. Production is holding at 75 per cent of capacity and, with no letdown in specifications for the holiday period, deliveries are being slowly pushed farther in the future. Labor disturbances in the automobile industry are not reflected at mills, which are a bit concerned about their own problems along this line.

Sheets

The holidays are making no difference in the pressure for sheet mill commodities. Although contracting is not particularly heavy, spot purchases are in good volume and some units are practically sold out for the first quarter. Many sales are now being made on the basis that salesmen must have offers confirmed by home offices. Numerous buyers are still concerned about prices, the impression being that if business continues as at present higher quotations may be expected.

Warehouse Business

Mill price advances are now being followed by warehouses, which have announced higher quotations on many of the principal items carried in stock. Sales are slightly below the November rate, but are making an unusual December showing. The second week in December found city sales at the peak of any week in 1936.

Reinforcing Bars

Following the lead of steel mills, dealers marked up prices on Dec. 23. How effective this move will be cannot now be determined because of general demoralization of price structures during recent weeks. It remains to be seen

whether prices will be stabilized or whether the move will be one by which new mill charges will be added to prices which will continue to vary according to the need for tonnages on shop books. Advances on bending charges are not in effect but the industry is seriously considering such a move.

Mid-Continent Petroleum Co., Tulsa, Okla., has let contract to Sheehan Construction Co., Daniels Building, Tulsa, for about 48 miles of 6-in. welded steel pipe from Fittstown oil field, near Ada, Okla., to Cromwell, Okla., for crude oil transmission to terminal station at last noted point. Cost over $300,000.

Public Utilities Commission, San Francisco, has low bid from Williams Brothers & Haas, Inc., Merchants' Exchange Building, for Crystal Springs pipe line No. 2 for trunk water service, at $643,939. Line will run from Crystal Springs Dam to point on El Camino Real, near Burlingame, Cal., comprising 24,600 ft. of 60-in. welded steel pipe, ⅜-in. plate, and 660 ft. of 78-in. welded steel pipe, ½-in. plate (Proposal 1).

Moundridge, Kan., plans steel pipe system for natural gas distribution. Financing will be arranged soon.

Mercedes Fuel Co., Mercedes and Edinburg, Tex., has awarded contract to J. L. McFadden Pipe Line Co., Houston, Tex., for welded steel pipe line to Edinburg from connection with main trunk line of Rio Grande Valley Gas Co., about six miles. Cost about $40,000.

Bitter Root Irrigation District, Hamilton, Mont., has let contract to J. L. McLaughlin, Great Falls, Mont., for welded steel pipe line over three gulches in lower Bitter Root Valley for water supply, comprising 2500 lin. ft. of 70-in., at $69,830.

Phillips Petroleum Co., Bartlesville, Okla., plans two 6-in. welded steel pipe lines in parts of Kelham and North Missouri Streets, Oklahoma City, for oil transmission. Cost close to $50,000. A. H. Riney is company engineer.

Plaquemine, La., plans steel pipe line system for municipal natural gas distribution. Estimates of cost are being made. Financing will be arranged through Federal aid. L. J. Voorhies, Plaquemine, is consulting engineer.

Compania de Petroleos de Mexico (Petromex), Mexico, D.F., plans welded steel pipe line from gas field at Poza Rica, State of Vera Cruz, to Mexico City, about 150 miles, for natural gas transmission. Compressor stations for booster service will be installed at points along route. A large terminal station and distributing plant will be built at terminus noted. Cost over $1,000,000. A Federal concession has been asked for construction and operation.

... Higher pig iron prices stimulate buying.

o o o

... Reinforcing bar jobbers advance prices $4 a ton.

BOSTON, Dec. 28. — The announcement last week that, effective Jan. 1, eastern Pennsylvania pig iron prices will be 50c. a ton higher has resulted in some buying of such brands, largely for mixture purposes, and sales of Buffalo brands, based on a belief they too will cost more next year, are reported. Aggregate business, however, is comparatively small. Shipments against old contracts are active. Some foundries intimate that they will have to buy iron in January or February to carry through the first quarter.

On Dec. 23, reinforcing bar distributors advanced prices $4 a ton. Local steel mill representatives say demand for their products is better than it has been in years and a shortage of some items in the first quarter is a possibility.

... High production rate likely for some time.

o o o

... Pig iron advance being talked of.

BUFFALO, Dec. 28. — With a holiday shutdown in all the Buffalo steel plants, the beginning of the week again found the previous high gait of operations resumed. Bethlehem's Lackawanna plant has 22 active open hearths; Republic Steel Corp., 7, and Wickwire-Spencer Steel Co., 2.

Sustained heavy operation appears to be in prospect indefinitely.

Pig iron demand continues good with shipments very satisfactory. There is a price advance sentiment, but nothing definite has come out of it thus far. Melters still are working on tonnage acquired before the last rise and are expected to come into the market again for first quarter requirements in instances where these were not satisfied in November.

Steel mills are using less scrap and more pig iron in their mixtures than heretofore, so the present high blast furnace operation seems likely to be sustained.

... Pipe lines awarded take 9169 tons of plates.

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... New business slow as strike continues.

SAN FRANCISCO, Dec. 28.— Two pipe-line projects involving an aggregate of 9169 tons of steel plates were awarded last week, introducing life into a quiet steel market. Everett, Wash., awarded 6000 tons of plates, to be used in a pipe line from Lake Champlain, to Western Pipe & Steel Co. An award of 3169 tons of plates for use in the second unit of the Crystal Springs pipe line near San Francisco was made to Consolidated Steel Corp.

Totals for the week in structural steel were light, with only 784 tons awarded, of which 571 tons is for construction of a stage for Twentieth Century-Fox Film Corp. Reinforcing bar awards were slightly larger than during the past few weeks with a total of 2763 tons.

The only activity in new projects was shown in cast iron pipe market. Three new jobs were announced with an aggregate of 351 tons. Bids will be opened Jan. 4 on two of them and Jan. 5 on the other.

Strike conditions and holiday inactivity have kept the market slow, though production continues steady. Hopes for an early strike settlement were again blasted by new outbursts between employers and strikers.

. . PHILADELPHIA . .

. . . Orders for first quarter are being received in fair volume.

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. . . Business in 1936 has exceeded that in 1935 by 100 per cent in some cases.

o o o

. . . Eastern Pennsylvania pig iron producers to advance price 50c. per ton Jan. 1.

PHILADELPHIA, Dec. 28—District sales offices are holding fourth quarter books open to Dec. 31 for business in all products other than sheets and strip, but mills are so filled with tonnage that each order, almost without exception, must be submitted to general sales offices before acceptance. A great deal of tonnage on construction projects is coming in at present.

Inquiries and orders at the new prices are holding up fairly well and considerable business has been taken on the new basis.

Year-end reports reveal that bookings in sales offices here for the month are running from 25 to 30 per cent ahead of November, and from 50 and 60 per cent to over 100 per cent above December, 1935; 1936 bookings are well ahead of 1935, as much as 100 per cent in some cases. Shipments for one office, up to December, were almost 100 per cent above the entire year 1935, while the December addition will increase the total so that 1936 will be about 110 per cent greater. The shipments this year for this office will exceed by a few thousand tons the 1930 total.

Structural awards continue in good volume, with reinforcing bars light.

Pig iron has been advanced 50c. per ton, effective Jan. 1, while scrap is unchanged.

Operations in the district are unchanged at 56½ per cent of capacity.

Pig Iron

A Jan. 1 pig iron advance of 50c. per ton has been announced by Eastern Pennsylvania producers. Due partially to the rising scrap market and higher prices for coal and coke, this advance is the second in a month, a $1 increase having gone into effect Dec. 1. No further Japanese orders have been reported in this district, but it is understood that nearby producers still are carrying on negotiations. No final disposition has yet been made of the application for further Federal funds to start up the Riddlesburg furnace, but an announcement is expected soon, since discussions on this subject are still being held. Current business is light, although it is surprisingly active, considering the extent to which most regular customers are covered.

Wire and Wire Products

Although inquiries and orders at the new prices are not heavy, business on hand is sufficient to occupy interests here well into the first quarter. This month, according to a leading seller, was about 100 per cent better than December, 1935, as concerns bookings, while the year so far is about 30 per cent above 1935.

Shapes and Bars

Another active week in shape awards was reported, with disposition being made of nearly 5000 tons. Leading the list was an award to Virginia Bridge Co. of 2000 tons for a du Pont rayon plant addition in Richmond, Va. The Owens-Illinois Glass Co., with four different projects, accounted for 1800 tons, most of which was awarded to Bethlehem Steel Co. Road work in New Jersey and Pennsylvania accounted for an additional 400 tons. Awards of only 200 tons of bars were reported, Bethlehem receiving the contract for an Atlantic Refining Co. building in Philadelphia.

Plates and Sheets

Most sheet producers are badly situated so far as deliveries are concerned. Inquiries and orders for sheets at first quarter prices are fairly good. The Jones & Laughlin Steel Corp. office here is now able to take orders for hot rolled and hot rolled annealed sheets in the heavier gages for its new mill in Pittsburgh, which started rolling these items recently. The Sun Shipbuilding Co. has booked two tankers of 12,900 gross tonnage each for the Standard Transportation Co.

. . GREAT BRITAIN . .

. . . Demand is unrelaxed in all branches.

o o o

. . . Steel makers disturbed by growing shortages.

LONDON, Dec. 28 (*By Cable*)—The British steel works holiday break was only long enough to complete urgent repairs necessitated by recent high capacity workings. Demand is unrelaxed in all branches and a 3s. advance in heavy steel home prices made no difference as consumers are only too eager to obtain materials. Contracts are booked over many months, but prices are subject to revision at the end of May. Trading nevertheless is quiet as makers are reluctant to add to heavy commitments.

Heavy specifications are being received from structural engineers, shipbuilders and other consumers. Large contracts have been placed by railroads for permanent way material and rolling stock.

British makers are gravely perturbed at growing shortage of Continental supplies. All grades of pig iron are very scarce, home consumers being strictly rationed and offers of big overseas business are refused. Hematite prices have been advanced 12s. 6d. per ton.

Tin plate demand is quieter

owing to holidays and recent price advance. Larger consumers are believed to be booked some months ahead and business may be quiet for some time, but unfilled orders approximate 6,000,000 boxes.

Continental iron and steel is firm with strong demand. Semi-finished steel, plates and sheets are practically unobtainable as makers are reluctant to sell owing partly to actual shortage and partly to anticipation of further price advance. British prices except hematite unchanged. Continental gold prices unchanged.

North Swanzey, N. H., is in the market for a round tonnage of pipe of various sizes. Bids will be received until Jan. 6 by E. P. Small, care of A. E. Martel Co., Keene, N. H.

Marshall, Tex., plans pipe lines for water system; also two reservoirs, 500,000-gal. elevated steel tank and tower, water treating station and other waterworks installation. Bond issue of $160,000 has been voted. H. J. Graeser is city engineer.

Madison, S. D., plans pipe lines for water system, including extensions in present lines and replacements. Fund of $27,273 has been secured through Federal loan and grant.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Jan. 6 for cast iron soil pipe; also for bends, unions, nipples and other fittings (Proposal 398-67).

Kalamazoo, Mich., plans extensions in pipe lines for water system; also installation of other waterworks equipment for improvement in present facilities. Cost about $170,000. L. A. Cobb, Kalamazoo, is engineer.

Courtland, Kan., plans pipe lines for water system; also other waterworks installation. Financing is being arranged through Federal aid. Paulette & Wilson, Farmers' Union Building, Salina, Kan., and National Reserve Bank Building, Topeka, Kan., are consulting engineers.

Alice, Tex., plans pipe lines for water system; also pumping station and other waterworks installation. Fund of $80,000 is being arranged. J. E. Ward, Harvey-Snider Building, Wichita Falls, Tex., is consulting engineer.

Englishtown, N. J., plans pipe lines for water system. Appropriation of $45,000 has been secured through Federal aid.

Augusta, Ga., plans pipe lines for extensions and improvements in water system; also extensions in filtration plant and other waterworks installation. Cost about $400,000. Financing is being arranged through Federal aid.

Ronan, Mont., plans pipe lines for extensions and replacements for water system. Fund of $30,800 is being secured through Federal aid.

Floresville, Tex., plans pipe lines for water system; also other waterworks installation. Fund of $45,000 is being arranged through Federal aid for this and extensions in sewerage system. E. P. Arneson, Gunter Building, San Antonio, Tex., is consulting engineer.

Smyrna, Tenn., will take bids soon for pipe lines for water system and other waterworks installation. Fund of $40,670 has been arranged through Federal aid. Freeland, Roberts & Co., Independent Life Building, Nashville, Tenn., are consulting engineers.

Maben, Miss., plans pipe lines for water system; also other waterworks installation, including elevated steel tank and tower. Fund of $38,000 has been secured through Federal aid. A. S. Brumby, Tupelo, Miss., is consulting engineer.

Los Angeles will open bids Jan. 4 on 175 tons of 20-in. for a water supply line for Department of Water and Power.

Medical Lake, Wash., will open bids Jan. 4 on 157 tons of 6 to 8-in. for a water supply line.

Los Angeles will open bids Jan. 5 on 119 tons of 40-in. for a Department of Water and Power project.

Business Activity 25% Below Normal

THE total volume of trade, including production, distribution, and financial activity, adjusted for normal long-term growth and seasonal variations, has risen to about 25 per cent below the estimated normal level from the low point of 46 per cent below normal in March, 1933, according to the monthly business survey of the National Industrial Conference Board.

Productive activity has advanced more rapidly than the total volume of trade. Production has regained roughly 55 per cent of the depression decline and now stands at a point about 18 per cent below the estimated normal level. Recovery has been least impressive in the financial field, where issuance of new securities is still lagging behind improvement in production and distribution.

Output of producers' goods has recovered 58 per cent of the 1929-32 decline, and recovery in consumers' goods output has amount to 54.3 per cent of the 1929-33 decline. It has often been stated that no lasting recovery could be expected until the producers' goods industries caught up with the improvement in the consumers' goods industries. This has now occurred, and the result is a better balanced recovery. No longer can the cyclical rise be characterized as a "consumers' goods recovery."

There has been a fairly steady, though not a sharp, recovery in both residential and non-residential construction since the depression low points were reached early in 1933. Total building awards in the first 11 months of 1936, as reported by the F. W. Dodge Corp., amounted to $2,475.6 million. This compared with $1,580.4 million in the corresponding months of 1935 and with a low of $1,255.7 million for the entire year 1933.

There are two reasons, the Conference Board points out, for believing that the upward trend in building activity will continue during 1937. The first is that sizable shortages of dwellings are known to exist. The second is that general business recovery is forcing a certain amount of expansion in plant.

Employment in non-agricultural activity had recovered, at the end of September, 1936, 66.3 per cent of the 1929-1933 decline. Latest estimates of the Conference Board place the number of unemployed workers at 8,673,000. This compares with peak unemployment of only slightly less than 16 million in the early part of 1933. Hourly wage rates in manufacturing industry in September and October were the highest on record. The purchasing power of average weekly earnings of factory workers at present is greater than at any time in 1929.

Bethlehem Steel Co. Buys Taubman Supply

THE Bethlehem Steel Co. has acquired by purchase the warehouses and business of the Taubman Supply Co., one of the largest distributers in the Southwest of oil country pipe and supplies, which has several branches in Oklahoma and Texas. The name of the company will be changed to the Bethlehem Supply Corp. Management of the company will remain unchanged.

Exports of industrial machinery in October increased to $16,000,332, the highest monthly figure so far this year and 22 per cent above the September shipments valued at $14,083,350. The rise was distributed over all lines, shipments in the various groups increasing over the September exports as follows: Power generating equipment, 63 per cent; construction and conveying machinery, 28 per cent; mining, well and pumping machinery, 24 per cent; power-driven metalworking machinery, 18 per cent; other metalworking machinery, 26 per cent; textile, sewing and shoe machinery, 8 per cent; other industrial machinery, 19 per cent, and printing and bookbinding machinery, 30 per cent. The 10-month total of exports of industrial machinery in 1936 is $140,489,759, $18,622,079 greater than for the entire year of 1935.

National Can Co., subsidiary of McKeesport Tin Plate Co., has purchased the Pittsburgh Can Co., Pittsburgh, manufacturer of steel kegs and pails.

. . . CLEVELAND . . .

. . . Heavy buying of steel has subsided, but pressure for deliveries is strong.

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. . . Large tonnage of structural steel placed for identified building projects.

o o o

. . . Lake furnaces probably will advance pig iron prices 50c. a ton.

CLEVELAND, Dec. 28.—The heavy buying of finished steel has subsided and more attention is being given by mills to get material on order rolled and by consumers to secure shipments as needed. Pressure for deliveries is severe. Most steel offices were closed from Thursday afternoon until Monday, which curtailed activity.

Ingot output in the Cleveland-Lorain district advanced one point this week to 77 per cent of capacity.

Structural shapes and plates were the most active items the past week as these are the only products that mills are now able to take for shipment during January. A heavy tonnage of structural shapes has been placed for identified projects. The first quarter prices will become effective Jan. 1 on all products regardless of whether any additional business can be taken for January rolling.

Activity in orders for bars, sheets, strip steel and wire products has declined as consumers have covered for rather extended requirements, placing orders at the new prices when they were unable to get tonnage on the mill books at the fourth quarter prices. Consumers are now figuring their requirements closely and generally are placing orders only for such additional steel as they expect to need in the next few weeks.

Warehouse prices are to be advanced Jan. 1 to conform to the mill advances.

Scrap prices have advanced another 50c. a ton.

Pig Iron

Lake furnaces probably will follow Pittsburgh district producers in advancing prices of all grades of pig iron 50c. a ton effective Jan. 1, but with the holiday interruption they have deferred consideration of the matter and are not likely to take definite action until the latter part of the week. Shipments have shown a gain for six consecutive months and will be larger in December than during any previous month of the year. Some consumers are building up stocks of iron at the old prices. Labor troubles caused the temporary holding up of some shipments by automotive foundries.

Bars, Plates and Shapes

Mills are well filled up with bar tonnage for January shipment and generally are declining additional business at the fourth quarter prices. Some sales are being made at the new prices. Shapes and plates are quite active as mills are still taking business at fourth quarter prices, not yet being entirely filled up with all the tonnage they can produce in January. Protections are being closed for considerable steel for identified jobs. For an addition to the plant of the Cleveland Twist Drill Co. 800 tons has been placed with the American Bridge Co. Toledo will open bids today for a welded steel pipe line requiring 2000 tons.

Sheets

New demand declined considerably the past week. However, consumers continue to place orders at the advanced prices and some tonnage has been entered that cannot be shipped until the second quarter. Buyers generally have orders on mill books for their requirements for some time and are now devoting more attention to deliveries and are crowding the mills for shipments.

Strip Steel

There was less activity in hot and cold strip the past week than for some time. With mills filled up for January, all new orders are being taken at first quarter prices. Shipments are heavy, although labor troubles have caused the temporary holding up of shipments to one automotive plant in the Detroit territory.

Warehouse Business

A $5 a ton advance has been made on cold finished strip to 3.25c., effective Jan. 1, and one jobber has advanced galvanized sheets $6 a ton, hot rolled $4 and hot rolled annealed $8. Advances on bars, plates and shapes to reflect the first quarter advance in mill prices are expected to be made effective Jan. 1.

Reinforcing Bars

Bending extras on reinforcing bars have been advanced by distributers $2 a ton to $8 for heavy and $18 for light bars following the recent $4 a ton advance in distributers' prices. Cleveland jobbers now quote new billet steel bars at 2.30c. and rail steel bars at 2.15c. The only job of any size pending is a Lorain County bridge requiring 190 tons.

Wire Products

Mills are well filled with orders for January shipment taken at the old prices and some new business has been entered at the advanced prices. Specifications are heavy for manufacturers' wire, cable and other products used in the manufacturing industry, as well as from jobbers.

Bolts and Nuts

Specifications are heavy against orders taken before the price advance and some makers have notified buyers that shipments against these contracts must be made by Jan. 1. Heavy specifications are coming from the motor car manufacturers and there is a good demand from all other classes of consumers.

. . . Sheets bought for March delivery.

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. . . Shipments of pig iron at a high rate.

ST. LOUIS, Dec. 28.—Despite the observance of the Christmas holidays, the market for finished and iron and steel was very active. There was considerable buying of sheets at first quarter prices for delivery well into March. Buyers of plates, shapes and bars placed specifications against low price contracts which expire on Dec. 31.

Shipments of pig iron continued at a high rate over the holidays, although new business was light. Mills and foundries continued for the most part uninterruptedly through the holiday season.

. . . 1936 production best since 1930.

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. . . Steel ingots compare favorably with 1929.

TORONTO, Ont., Dec. 28.—The year 1936 registered the highest production record for pig iron in Canada since 1930, while steel ingots compare favorably with the record years of 1928 and 1929. Ferroalloys rose to a new high record. The table below shows comparative production figures on iron, steel and ferroalloys in gross tons from 1928 to 1936, inclusive:

Trading generally was quiet in the Canadian iron and steel markets during the year-end holiday season. Local interests, however, express the opinion that the minor slump will be of short duration and look for general speeding up in demand for all lines of iron and steel and their products immediately after the turn of the year. The Canadian iron and steel industry will enter the new year with excellent prospects for a higher volume than that of 1936.

. . . Sheet orders continue at a heavy rate.

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. . . Sales now being made for March delivery.

CINCINNATI, Dec. 28. — First quarter tonnage placed with district sheet producers is unusually heavy. In fact, present figures reveal weekly bookings to be substantially in excess of capacity production and no let-up is in sight. One interest indicates that schedules are filled through February with delivery on many grades of sheets unlikely until the middle of March. At the present pace, district mills may be booked through the first quarter before the end of this month. Consumers are apparently eager to build stocks or at least commit themselves far in advance to maintain a steady flow of material.

Ingot production is adhering to the level set three weeks ago at about 93 per cent of capacity. Thirty-one open hearths are in production and will continue this week. One interest is operating all furnaces while other companies are holding one furnace each in reserve.

The pig iron market is without aggressive purchasing. Small orders to fill out needs are being received, but coverage of future needs does not interest melters.

While Northern iron producers in this area have not advanced prices in keeping with Pittsburgh increases, Southern furnaces have increased first quarter quotations 50c. This iron will be $20.69 a ton delivered in Cincinnati after Jan. 1 and on the usual differential Northern iron would be quotable at $21.07. Nearby producers are considering the matter carefully and expect to act before the end of this week.

Coke specifications are heavy, but new business is nil. Reports of contemplated price increases are unconfirmed by oven interests.

. . . Christmas caused little interruption.

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. . . Full schedules assured through January.

BIRMINGHAM, Dec. 28.—Mills lost little time after Christmas in returning to full operating schedules. In some instances only Christmas Day was observed as a holiday. Heavy backlogs are keeping production at a high point, which will be maintained all through January, even without the aid of additional bookings.

Blast furnace and open hearth operations remain steady, with 15 blast furnaces and 16 open hearths active.

Chicago Bridge & Iron Co. has been awarded a 50,000-gal. tank by the Tennessee Valley Authority for delivery to the Hiwassee project in North Carolina.

A sit-down strike occurred last week at the American Casting Co., when employees demanded wage increases.

	Pig Iron	Steel Ingots	Steel Castings	Ferro-Alloys
1928	1,037,727	1,190,001	44,718	44,882
1929	1,090,244	1,309,543	70,145	80,010
1930	747,178	957,430	54,313	65,223
1931	420,038	664,826	37,055	46,764
1932	144,130	312,360	22,915	16,161
1933	227,315	394,059	15,920	30,133
1934	406,955	738,430	20,640	33,085
1935	599,794	904,180	31,502	56,901
1936*	660,830	1,075,660	32,930	71,640

*December figures estimated.

. . . . NEW YORK. . . .

. . . One major seller withdraws from sheet and strip market.

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. . . Export prices on pipe higher; orders increase.

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. . . Pig iron advance of 50c. imminent; shipments increase.

NEW YORK, Dec. 28—Orders continued to pour in during Christmas week in such volume that many large mills are now faced with a delivery problem on certain products that may give rise to considerable trouble over the entire first quarter. One major producer is completely out of the market on sheets and most grades of strip, and several other sellers are nominally stating a delivery promise of from 14 to 16 weeks in answer to current inquiries. The famine condition in sheets and strip has so far found no counterpart in other types of steel; quick delivery is still possible on plates, structural steel and certain bar items, and a number of producers continue to take orders on these latter grades at old price levels.

As there has not been a great volume of sheet and strip demand at the higher first quarter price levels, it is assumed that the enormous backlogs in these products all carry the lower price. For this reason, it seems hardly likely that mills will receive much benefit from the recent price advances during first quarter. Also significant is the fact that most of the current buying activity has been concentrated in those items on which prices did not advance, such as tin plate, pipe, etc., or is made up of orders on identified projects, on which several weeks remain for railroads and building contractors to cover future requirements at lower price levels.

Several sellers of pipe during the past week re-entered the export market at somewhat higher price levels than those in effect a month ago. A number of sizable orders have been reported, particularly for the Far East and South America.

Pig Iron

An increase of 50c. a ton, effective for first quarter shipment, has been announced by Chateaugay Ore & Iron Co. on its low-phosphorus iron, making the base price at Standish, N. Y., $25.50 a ton. Some Eastern Pennsylvania furnaces have indicated a 50c. increase covering all grades, and it is assumed that a general advance will become effective shortly. Sales of iron in this district are quiet, but considerable activity has developed in shipments. With a few days remaining in which to dispose of existing contracts, order books may be very largely cleared of fourth quarter tonnages by Dec. 31. Foreign inquiry for domestic brands of iron is a continuing factor. In addition, a domestic inquiry for 5000 tons of Southern iron, supposedly for speculative storage, has been reported. The 54,000 tons of cast iron tunnel segments needed to construct the underwater tubes of the Manhattan-Queens vehicular tunnel under the East River were awarded to United States Pipe & Foundry Co. at a bid price of $3,356,001.

Frank Cordes Looks For 1937 Gains

COMMENTING on the prospects for the steel industry in 1937, Frank Cordes, president of Blaw-Knox Co., Blawnox, Pa., says that the steel companies are facing "an almost unprecedented demand for their products in the new year." He adds that, "now that the volume is expanding rapidly, they (the mills) are finding that more modern facilities would be advantageous."

The spurt in the purchase of new rolling mill facilities in 1936 will be followed in 1937, in Mr. Cordes' opinion, by the installation of additional open-hearth furnace capacity and in improvement of existing open-hearth furnaces.

Mr. Cordes also points out that the nation's public utility companies probably will engage in long-expected expansion programs. He estimates that the utilities will spend 15 to 20 per cent more in 1937 than they did in 1936. "The rising demand for electric power," he says, "is straining facilities, and this branch of the utility industry is expected to spend about $400,000,000 for new buildings, transmission lines and power-house equipment. This would represent a gain of 40 per cent over the old year.

"While all construction still is far below its former peak, it has shown impressive gains over 1935, and it would be natural to assume that the continuation of these gains will result in the purchase of more steel and equipment, such as excavating machinery, concrete mixing machinery and allied lines.

"Construction costs have been soaring. A shortage of skilled labor is widely anticipated, and both skilled and unskilled wage rates have increased. This feature alone is moving the equipment manufacturer into a more strategic position, since money will be spent for facilities to save time. The ratio of equipment purchases to construction volume will likely rise, since we are in a rising market for construction services. While expenditures for public works probably will continue at about the level of 1936, a continuation of the increased rate of activity in private work is to be expected.

"The rising trend of receipts from motor vehicle fees and gasoline taxes appears likely to justify increased highway budgets, which will be further helped by Federal aid for 1937 highway work provided by the last Congress.

"The end of this year has not been marked by any material decline in activity such as usually takes place in December. While predictions about the future are always dangerous, I feel that the improvement gained so much momentum in 1936 that this impetus will carry over into the new year."

To Readers of The Iron Age

THE next issue of THE IRON AGE, that of Jan. 7, 1937, will be the Annual Review Number, an established feature of long standing in the service this publication offers to its readers. Every effort has been put forth to excel in pictorial presentation and in excellence of editorial material the similar issues of past years.

For convenience of readers the issue will be thoroughly sectionalized. All technical articles will be grouped according to their special reader appeal, including such divisions as metals, machine tools, small tools and gages, forming and forging, presses and sheet metal machinery, power transmission, materials handling, steel mill equipment, heat treating, furnaces and refractories, welding and fabricating, parts on contract, metal cleaning and finishing, plant equipment, foundry equipment.

In addition to these technical headings there will be articles devoted to the highly interesting business developments of 1936. Eugene G. Grace, president of Bethlehem Steel Corporation, has contributed the leading article on "Progress in Steel." Other features include the highlights of the steel industry, automobile industry, building construction, the railroads, steel housing, agriculture; also a review of developments in installation of continuous sheet-strip mills and a compilation of existing capacity in tin plate, showing the pronounced trend toward cold reduced plate. The usual statistical features include distribution of steel products by industries, world output of steel and pig iron and a long-time record of prices and production statistics.

—THE EDITORS.

REINFORCING STEEL

. . . Awards of 2515 tons —1900 tons in new projects.

AWARDS

Philadelphia, 200 tons, building for Atlantic Refining Co., to Bethlehem Steel Co.

Tucumcari, N. M., 1150 tons, Conchas Dam, to Colorado Fuel & Iron Co.

Los Angeles, 204 tons, bridge over Los Angeles River, to Blue Diamond Steel Corp.

Newport Beach, Cal., 208 tons, bulkhead construction, to Blue Diamond Steel Corp.

Los Angeles, 153 tons, auditorium for Jefferson high school, to Soule Steel Co.

Los Angeles, 145 tons, Vermont Avenue school, to Blue Diamond Steel Corp.

Los Angeles, 150 tons, Tujunga high school, to Consolidated Steel Corp.

Denver, 301 tons, All-American Canal project, to Bethlehem Steel Co.

NEW REINFORCING BAR PROJECTS

St. Albans, Vt., 105 tons, post office.

Lincoln, Ill., 250 tons, Illinois State ward buildings.

Clinton, Iowa, 400 tons, dam No. 13.

Chicago, 400 tons, Sanitary District work, section 17B.

Chicago, 350 tons, Sanitary District sewer on southwest side.

Hatch, N. M., 117 tons, Caballe Dam; bids opened.

Boise, Idaho, 172 tons, Black Canyon Canal project; bids opened.

Denver, 100 tons, Bartlett Dam reclamation project; bids opened.

Nickel Steel Plates in Locomotive Boilers

THE dual demand for increased power and speed in the locomotives that are hauling today's faster moving freight calls for construction that allows no compromise with strength and safety. Thus in designing the new 1200 series freight locomotives that have recently been built in the Roanoke shops of the Norfolk and Western Railway, the railroad's engineers found it essential to maintain full strength, but also to reduce the weight of the rear portion of the boiler in order to properly distribute the weight of the front and back engines of these articulated locomotives.

The solution of the problem was found in the use of nickel steel boiler plates made by the Bethlehem Steel Co. These nickel steel 1-in. and ¾-in. plates used instead of thicker and heavier plain carbon steel plates for the third and fourth barrel courses and roof sheets, provided the necessary strength, and at the same time tightened the boiler at the back end.

Two locomotives, Nos. 1200 and 1201, have been completed and are now in service. Five more locomotives of a different type, in which Bethlehem nickel steel plates will also be used, are under construction in the railway's shops.

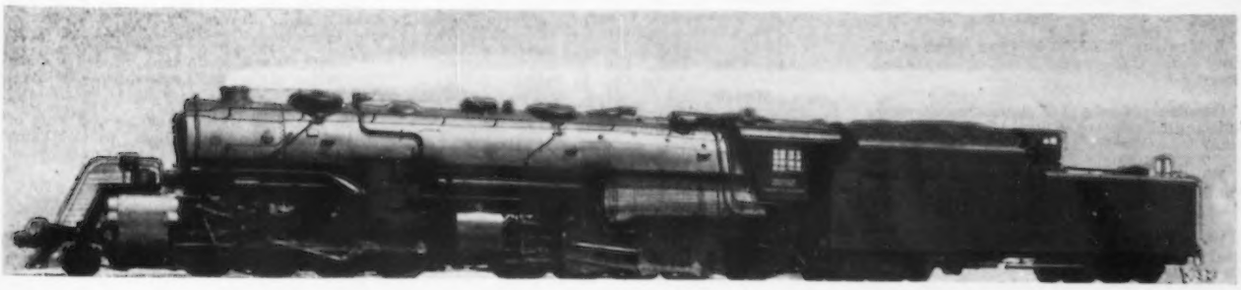
The locomotives of the 1200 series are the largest and fastest freight engines ever operated by the Norfolk and Western and rank among the speediest in the country.

Equipped with roller bearings and "floating axles," the engine's twelve huge 70-in. driving wheels can flash over the rails at a speed of 65 to 70 mi. per hr. Officials say the new locomotives will enable the Norfolk and Western to provide a freight service as fast as that of passenger or express trains.

The 1200 series has a tractive effort of 104,500 lb., is 120 ft., 7½ in. long, and in working order, weighs nearly a million pounds. No oil can is needed here. Smooth running and remarkably quiet, oil is pumped mechanically to practically all sliding and other parts of the engine. Another innovation is two huge cast steel bed plates, weighing approximately 111,000 lb., which have displaced the conventional built-up type frames and cylinders and eliminated 700 major and minor parts. No direct weight is carried on the driving axles.

The mammoth boiler, with pressure of 275 lb. per sq. in., is nearly 61 ft. long, weighs 148,500 lb., and holds 9,835 gal. of water. Electrically welded throughout, the firebox has 122½ sq. ft. of grate surface. The tender carries twenty-six tons of coal and 22,000 gal. of water.

The screw machine products and wood screw industry made goods valued at $63,029,478 (at f.o.b. factory prices) in 1935, a gain of 88.4 per cent over the 1933 figure, according to preliminary figures of the Bureau of the Census. The number of wage earners employed in 1935 was 15,018, an increase of 46.7 per cent over 1933. Total wages rose to $16,825,014, an increase of 88 per cent over wages paid in 1933.



FABRICATED STEEL

. . . Lettings in better volume at 28,875 tons compared with 23,855 tons last week.

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. . . New projects decline to 10,815 tons as against 23,325 tons a week ago.

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. . . Plate awards total 11,970 tons.

NORTH ATLANTIC STATES

Manchester, N. H., 700 tons, MacGregor bridge, to American Bridge Co.

State of Connecticut, 148 tons, three State bridges, to two unnamed bidders.

New Haven, Conn., 3250 tons, Southern New England Telephone building, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

East Jamaica, Vt., 115 tons, Ewing bridge, to Vermont Structural Steel Corp., Burlington, Vt.

New York, 660 tons, apartment house, 266 East 73rd Street, to Bethlehem Fabricators, Inc.

New York, 2350 tons, Sixth Avenue subway, 101 West 18th to West 27th Streets, to American Bridge Co.

Brooklyn, 605 tons, women's pavilion, 4810 Tenth Avenue, to Ingalls Iron Works Co., Birmingham.

Brooklyn, 1750 tons, extension, Williamsburg Power Plant, to American Bridge Co.

Tonawanda, N. Y., 230 tons, Sheridan Drive railroad crossing, to Bethlehem Steel Co.

Medina, N. Y., 650 tons, factory building, H. J. Heinz Co., to Bethlehem Steel Co.

Newark, N. J., 2260 tons, airport hangar for Treasury Department, to Belmont Iron Works, Philadelphia.

Gaines Junction, Pa., 200 tons, highway bridge, to American Bridge Co.

Mill Creek, Pa., 450 tons, highway bridge, to American Bridge Co.

Karns, Pa., 775 tons, viaduct, to Bethlehem Steel Co.

Lebanon, Pa., 200 tons, senior high school, to Bethlehem Steel Co.

Little Falls, N. Y., 1240 tons, railroad crossing elimination, to Bethlehem Steel Co.

Bridgeton, N. J., 100 tons, Owens-Illinois Glass Co., power house, to Bethlehem Steel Co.

Camden, N. J., 190 tons, maintenance building, Delaware River Bridge Commission, to Bethlehem Steel Co.

Woodbridge, N. J., 145 tons, Pennsylvania Railroad bridge, to Bethlehem Steel Co.

Philadelphia, 165 tons, Crown Cork & Seal building, to Lehigh Structural Steel Co., Allentown, Pa.

Chester County, Pa., 215 tons, crossing elimination, to Bethlehem Steel Co.

Glassport, Pa., 180 tons, Copperweld Steel Co. mill building, to Levinson Steel Co., Pittsburgh.

Baltimore, 145 tons, United States Industrial Alcohol Co., to Maryland Steel Products Co.

Washington, 125 tons, housing project, to Roslyn Steel & Cement Co., Washington.

THE SOUTH

State of North Carolina, 600 tons, Blue Ridge Parkway bridge for Department of Agriculture, to Bethlehem Steel Co.

Richmond, Va., 2025 tons, addition to building, E. I. duPont de Nemours & Co., to Virginia Bridge Co., Roanoke, Va.

Greenwood, S. C., 305 tons, Paul Wright & Co. building, to Virginia Bridge Co.

Fulton-Douglas Counties, Ga., 155 tons, to Bethlehem Fabricators, Inc.

Louisville, 165 tons, Stratton & Terstegge factory, to Bedford Foundry & Machine Co., Bedford, Ind.

CENTRAL STATES

Cleveland, 800 tons, addition for Cleveland Twist Drill Co., to American Bridge Co.

Cincinnati, 200 tons, community building for Treasury Department, to William Lang & Sons Co.

Vermillion, Ohio, 720 tons, highway bridge, to Burger Iron Co., Akron.

Streator, Ill., 260 tons, furnace steel, Owens-Illinois Glass Co., to Pittsburgh Bridge & Iron Works, Pittsburgh.

Streator, Ill., 800 tons, factory and warehouse, Owens-Illinois Glass Co., to Bethlehem Steel Co.

Rockford, Ill., 285 tons, addition to building, to Mississippi Valley Structural Steel Co., St. Louis.

Gas City, Ind., 650 tons, warehouse, Owens-Illinois Glass Co., to Indiana Bridge Co., Muncie, Ind.

Red Wing, Minn., 1670 tons, dam in Mississippi River, to Lakeside Bridge & Iron Co., Milwaukee.

Minot, N. D., 860 tons, bridge, to Minneapolis-Moline Power Implement Co., Minneapolis.

Aberdeen, S. D., 390 tons, post office, to Bethlehem Steel Co.

WESTERN STATES

Hardin, Mont., 610 tons, Holly Sugar Co. plant, to Vierling Steel Works, Chicago.

Colorado Springs, Colo., 505 tons, Bijou Street bridge, to American Bridge Co.

Denver, 300 tons, warehouse, to E. Burkhardt & Sons, Denver.

Denver, 215 tons, bridge, to Midwest Steel & Iron Co., Denver.

Salt Lake City, Utah, 395 tons, Montgomery Ward store, to Minneapolis-Moline Power Implement Co.

Anaheim, Cal., 115 tons, gymnasium, to Pacific Iron & Steel Co., Sacramento.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Center and Green, Me., 300 tons, Androscoggin River bridge.

Lynn, Mass., 260 tons, extension to garage, Eastern Massachusetts Street Railway Co.

New York, 400 tons, alterations to building, Fifth Avenue Realty Corp.

Westchester County, N. Y., 600 tons, 17 to 23 shafts for city of New York.

Ulster County, N. Y., 200 tons, shafts for city of New York.

Corning, N. Y., 1100 tons, Chemung River bridge.

Harrison, N. J., 260 tons, plate shop for Worthington Pump & Machinery Co.

THE SOUTH

Austin, Tex., 1100 tons, bridge.

CENTRAL STATES

Columbia Park, Ohio, 1000 tons, Columbia power station, unit No. 3, Cincinnati Gas & Electric Co.

Chicago, 200 tons, 47th Street subway for Chicago Park district.

Chicago, 200 tons, theater and commercial building, Northern Amusement Corp

Milwaukee Road and Pennsylvania Railroad, 500 tons, six turntables.

Stevens Point, Wis., 400 tons, high school.

Streator, Ill., 1000 tons, building.

Gas City, Ind., 1000 tons, building.

Merom, Ind., 700 tons, bridge.

Hammond, Ind., 550 tons, building.

WESTERN STATES

Denver, 295 tons, State underpass and approaches; bids opened.

Nicolaus, Cal., 500 tons, Feather River bridge; bids Jan. 2.

State of California, 750 tons; 450 tons for bridges over Santa Clara River, and 300 tons for bridges over Tehachapi Creek, both for Southern Pacific Co.

FABRICATED PLATES

AWARDS

Kansas City, Mo., 950 tons, four barges for Socony-Vacuum Oil Co., to Kaw Point Boat Works.

Los Angeles, 1850 tons, welded pipe, San Gabriel dam, to Western Pipe & Steel Co., San Francisco.

Everett, Wash., 6000 tons, pipe line from Lake Champlain, to Western Pipe & Steel Co.

San Francisco, 3169 tons, second unit of Crystal Springs pipe line, to Williams Brothers & Haas; steel to Consolidated Steel Corp., Los Angeles.

NEW PROJECTS

Milton, Vt., 200 tons, Public Electric Light Co. improvements.

Yakima, Wash., 250 tons, syphon.

. . .NON-FERROUS. . .

. . . Domestic copper raised to 11.62½c. basis.

o o o

. . . Lead still active despite higher price level.

o o o

. . . Zinc firm but inactive; tin dull.

NEW YORK, Dec. 28—Domestic producers of electrolytic copper raised the price ⅝c. a lb. early last week, following a further advance in the foreign market. The new price for the red metal therefore is 11.62½c., Connecticut Valley. With the application of the higher level on Dec. 22, consumers were caught unawares, and while many were willing immediately to meet the advance, confusion developed from the restricted sales policy of most producers. In other words, sufficient metal was not available even at the 11.62½c. figure. The ensuing holiday period tended to restrain activity considerably, and the market now is quieter. Speculative selling abroad has eased the price tension in that sector, with at present a wide range in quotations prevailing. Domestic sales in the month so far are well over 100,000 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	Dec. 22	Dec. 23	Dec. 24	Dec. 26	Dec. 27
Electrolytic copper, Conn.*	11.62½	11.62½	11.62½	11.62½	11.62½
Lake copper, N. Y.	11.75	11.75	11.75	11.75	11.75
Straits tin, spot, New York	52.00	51.90	51.80	....	52.25
Zinc, East St. Louis	5.45	5.45	5.45	5.45	5.45
Zinc, New York†	5.82½	5.82½	5.82½	5.82½	5.82½
Lead, St. Louis	5.85	5.85	5.85	5.85	5.85
Lead, New York	6.00	6.00	6.00	6.00	6.00

* Delivered Connecticut Valley; price ¼c. lower delivered in New York.
† Includes emergency freight charge.
Aluminum, virgin 99 per cent plus 19.00c.-21.00c. a lb. delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 17.00c. a lb. delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 13.25c. a lb., New York.
Quicksilver, $88.50 to $92.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 10.65c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	53.25c. to 54.25c.
Tin, bar	55.25c. to 56.25c.
Copper, Lake	12.75c. to 13.75c.
Copper, electrolytic	12.75c. to 13.75c.
Copper, castings	12.00c. to 13.00c.
•Copper sheets, hot-rolled	18.25c.
•High brass sheets	16.37½c.
•Seamless brass tubes	18.62½c.
•Seamless copper tubes	18.75c.
•Brass rods	14.37½c.
Zinc, slabs	6.75c. to 7.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.75c.
Lead, American pig	7.00c. to 8.00c.
Lead, bar	8.00c. to 9.00c.
Lead, sheets, cut	8.75c.
Antimony, Asiatic	13.00c. to 14.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.50c. to 20.00c.
Solder, ½ and ½	31.50c. to 32.50c.
Babbitt metal, commercial grades	25.00c. to 65.00c.

* These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 33⅓ per cent allowed off for extras, except copper tubes and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	55.25c.
Tin, bar	57.25c.
Copper, Lake	12.62½c. to 12.75c.
Copper, electrolytic	12.62½c. to 12.75c.
Copper, castings	12.37½c to 12.62½c.
Zinc, slabs	6.50c. to 6.75c.
Lead, American pig	6.50c. to 6.60c.
Lead, bar	9.25c.
Antimony, Asiatic	15.50c.
Babbitt metal, medium grade	21.50c.
Babbitt metal, high grade	59.25c.
Solder, ½ and ½	33.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.87½c.	9.62½c.
Copper, hvy. and wire	8.75c.	9.25c.
Copper, light and bottoms	8.00c.	8.50c.
Brass, heavy	5.37½c.	6.00c.
Brass, light	4.50c.	5.25c.
Hvy. machine composition	7.75c.	8.25c.
No. 1 yel. brass turnings	6.50c.	7.00c.
No. 1 red brass or compos. turnings	7.25c.	7.75c.
Lead, heavy	4.87½c.	5.25c.
Sheet aluminum	13.25c.	14.75c.
Zinc	3.00c.	3.37½c.
Cast aluminum	12.12½c.	13.25c.

Zinc

Although established firmly at 5.45c. a lb., East St. Louis basis, this market shows little turnover. Inquiry on the part of consumers has receded considerably, and, in addition, producers continue to restrict offerings. Certain low-stocked interests have practically withdrawn from the market by quoting 5.50c. and 5.55c. to potential customers. As announced last week, all sellers are asking 5.55c. on orders accepted for second quarter shipment, but the majority are limiting first quarter delivery quotations to 5.45c.

Lead

Buying of lead in above-average volume continues, with the market quotable since a week ago at 6.00c. a lb., New York, and 5.85c., St. Louis. About the only change that can be pointed to is that sellers are offering the metal more freely and waiting lists of unfilled inquiry have about been cleaned up. Foreign quotations continue strong, an advance in the London market this morning having placed lead there at a price equivalent of approximately 6.18c. a lb. in American currency. Domestic prices, although unchanged, are consequently very firm, and consumer interest on this side is prompted by the apparently bullish outlook.

Tin

The market remained very quiet all last week pending the holidays. Prices tended downward. The New York spot Straits quotation tapered to a low on Dec. 24 of 51.80c. a lb., but with the market's reopening today climbed to 52.25c. Dealers and importers are realizing little or no business, however, and no change is expected before January. Official London prices for standard metal this morning were £233 10s. spot and £233 15s. futures. The Eastern quotation was £232.

Lead Statistics

Refined lead stocks underwent a decline during November of 6516 tons to 176,914 tons at the month's end. November shipments decreased 9057 tons from the October volume to 50,153 tons, while production increased 1469 tons to 43,625 tons.

IRON AND STEEL SCRAP

. . . Composite unchanged at $17.75; further rises expected in some quarters.

o o o

. . . Elimination of freight surtax may hold prices slightly lower.

ANORMAL lessening in activity during the Christmas and New Year holiday periods, together with a mild reaction to the sharp price rises of the previous two weeks, served to keep prices on important grades from again advancing during the past week. Consequently, the composite price for heavy melting steel is unchanged at $17.75. That there will be further rises in quotations on important grades after the first of the year is considered very likely in some quarters, but other observers are of the opinion that price movements during the next fortnight will not be large. Those holding the latter view point to the fact that practically all of the recent activity has been predicated on broker-dealer transactions with little heavy consumer buying in the market to support the spectacular advances in quotations over the past month.

Pittsburgh

Owing to most business offices closing for the Christmas holidays, activity was curtailed somewhat during the past week. However, the market continues strong, and the quiet situation is giving brokers a chance to cover their shortages. Some dealers are prophesying $20 and higher for No. 1 in the near future, but there is little chance of substantial tonnages being purchased before the first of the year. There is a heavy demand for railroad specialties, and the market for these items is exceptionally strong.

Buffalo

Quotations moved sharply upward last week as sizable transactions were made at prices which were the highest in recent years. Approximately 5000 tons of No. 1 and No. 2 steel have been sold, at $17.75 for the No. 1 and $16.75 for the No. 2. With sustained heavy operations and insufficient accumulations of scrap throughout the district, available supplies are at a premium. A short time previously to the above-mentioned transaction, another mill bought 5000 tons of No. 2 steel at $15.75 or $16, a considerable advance over the previous purchase prices, and this mill is again in the market. Values are increasing so rapidly that a supposedly good sale often depreciates so rapidly that it cannot be covered at a profit.

Chicago

Railroad offerings continue to be snapped up quickly and prices as high as $18.33 a gross ton have been paid by brokers for the heavy melting grade. Cast grades, though now priced close to the cost of pig iron, are in exceptionally strong demand. Shipments of practically all classes of scrap are coming from an extremely wide area and there is some speculation as to what will happen should heavy snow and freezing weather check preparation and shipment. On the other hand, there is the negative influence of labor troubles which might temporarily check consumption by industry.

Cincinnati

The market here is steady and strong. Although little new business was placed during the past week, there was a scattered demand for fill-in material. Dealers are anticipating boom business after the turn of the year and are bidding strongly for available material. Schedules are unchanged, but nominal since scrap is apparently worth whatever the seller can obtain.

Philadelphia

Although still very strong, the price of scrap has come to a standstill for the present at least. A sale of No. 1 steel is looked for within the next two weeks, and is expected to bring not less than $17. Due to the advancing price of pig iron, cast grades are in unusual demand and were higher this week. Scrap is not easy to obtain because of a decided reluctance on the part of all holders to sell their material.

Cleveland

The market continues very strong with prices still tending upward, although activities were somewhat curtailed by the holiday period. A purchase of steel making scrap was made by a Youngstown district plant which paid $19 for No. 1 steel, or 50c. a ton higher than another steel plant in that district had paid the previous week. The same consumer paid $18 for No. 2 steel and No. 1 busheling. Brokers are paying $18.50, and according to some reports as high as $19, for No. 1 steel for the Valley district, and $17.50 for No. 2 to cover against Youngstown district orders. Machine shop turnings, which lagged behind other grades in advancing, have been marked up $2 a ton in the Youngstown district. While there has been no new consumer activity in the Cleveland area, steel making grades have further advanced 50c. a ton in Cleveland and rerolling rails have been marked up $2 a ton.

Boston

I. C. C.'s decision not to extend emergency freight charges after Dec. 31 has put a decided damper on business. Brokers, in the hope of obtaining the 40c. a ton difference in rates, are holding back shipments on old contracts and not committing themselves further except on spot business. Furthermore, a scarcity of vessel space has checked exports. Prices are generally holding very strong, however, with the market for bundled skeleton and short steel turnings higher. Cleaned engine blocks are moving rather freely at $10.50 a ton on cars, and there is a good call for cotton ties at $8.50. New England foundries are taking a keener interest in cast, and where freights are highest have paid $15 a ton delivered within the past day or so. The lowest reported sale is $13.14 a ton delivered.

Detroit

This market again took an upward turn last week, with price advances ranging from 50c. to 75c. a ton. Thus far, this is largely a brokers market, since there has been practically no buying on the part of local consumers during the past several weeks. Out-of-town markets are greatly influencing Detroit prices, and scrap shortages are reported in several mill areas. Brokers point to ore and coke shortages as indicating higher per cent of scrap in open-hearth melt, together with attempts of Japanese buyers to pick up scrap and pig iron at any price. This strong market is expected to continue.

New York

Movement of scrap to consuming mills has been appreciably reduced by holiday interruptions, but the undertone continues strong and prices, in some instances, are higher. New York dealers have advanced the buying price on steel car axles and shafting $1 a ton, and have boosted certain cast grades by a lesser amount. The upward trend in domestic quotations has effected a readjustment in export prices, with heavy melting steel for foreign account quotable at a $1 a ton advance. Brokers, however, are placing little new business with overseas buyers, but continue to ship moderately on old contracts.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$19.00 to $19.50
No. 2 hvy mltng. steel.	17.50 to 18.00
No. 2 RR. wrought....	19.00 to 19.50
Scrap rails	19.25 to 19.75
Rails, 3 ft. and under..	21.50 to 22.00
Comp. sheet steel	19.00 to 19.50
Hand. bundled sheets.	18.00 to 18.50
Hvy. steel axle turn...	17.50 to 18.00
Machine shop turn.....	14.00 to 14.50
Short shov. turn.	14.00 to 14.50
Mixed bor. & turn.....	13.50 to 14.00
Cast iron borings	14.00 to 14.50
Cast iron carwheels...	17.50 to 18.00
Hvy. breakable cast....	15.00 to 15.50
No. 1 cast	17.00 to 17.50
RR. knuckles & cplrs.	23.00 to 23.50
Rail coil & leaf springs	23.00 to 23.50
Rolled steel wheels....	23.00 to 23.50
Low phos. billet crops.	23.50 to 24.00
Low phos. sh. bar.....	23.00 to 23.50
Low phos. punchings..	22.50 to 23.00
Low phos. plate scrap.	22.50 to 23.00
Steel car axles	21.50 to 22.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$17.50 to $18.00
No. 2 hvy. mltng. steel.	16.50 to 17.00
Comp. sheet steel	17.25 to 17.75
Light bund. stampings	16.50 to 17.00
Drop forge flashings..	17.00 to 17.50
Machine shop turn.....	11.50 to 12.00
Short shov. turn.	12.00 to 12.50
No. 1 busheling	16.50 to 17.00
Steel axle turnings	15.00 to 15.50
Low phos. billet crops	22.00 to 22.50
Cast iron borings	12.00 to 12.50
Mixed bor. & turn....	12.00 to 12.50
No. 2 busheling	12.00 to 12.50
No. 1 cast	18.00 to 18.50
Railroad grate bars...	12.00 to 12.50
Stove plate	10.00 to 10.50
Rails under 3 ft.	22.00 to 22.50
Rails for rolling	20.00 to 20.50
Railroad malleab'e ...	18.00 to 18.50
Cast iron carwheels....	18.50 to 19.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$16.00 to $16.50
No. 2 hvy. mltng. steel.	14.50 to 15.00
Hydraulic bund., new.	15.75 to 16.25
Hydraulic bund., old..	13.50 to 14.00
Steel rails for rolling..	17.00 to 17.50
Cast iron carwheels..	18.00 to 18.50
Hvy. breakable cast...	16.50 to 17.00
No. 1 cast	17.50 to 18.00
Stove plate (steel wks.)	13.50 to 14.00
Railroad malleable ...	17.00 to 18.00
Machine shop turn....	10.50 to 11.00
No. 1 blast furnace....	10.00 to 10.50
Cast borings	10.00 to 10.50
Heavy axle turnings..	.... 14.50
No. 1 low phos. hvy....	20.00 to 20.50
Couplers & knuckles ..	20.50 to 21.00
Rolled steel wheels ...	20.50 to 21.00
Steel axles	21.00 to 21.50
Shafting	21.50 to 22.00
No. 1 RR. wrought....	16.00 to 16.50
Spec. iron & Steel pipe	14.50 to 15.00
Bundled sheets	14.00 to 14.50
No. 1 forge fire.....	14.50 to 15.00
Cast borings (chem.).	10.50 to 13.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel.....	$17.50 to $18.00
Auto. hvy. mltng. steel.	14.75 to 15.25
Alloy free	15.75 to 16.25
Shoveling steel	17.50 to 18.00
Hydraul. comp. sheets.	16.75 to 17.25
Drop forge flashings..	14.50 to 15.00
No. 1 busheling	16.50 to 17.00
Rolled carwhee's	20.00 to 20.50
Railroad tires, cut	20.00 to 20.50
Railroad leaf springs..	20.00 to 20.50
Axle turnings	20.00 to 20.50
Steel coup. & knuckles	19.00 to 19.50
Coil springs	22.00 to 22.50
Axle turn. (elec.)	17.25 to 17.75
Low phos. punchings..	21.75 to 22.25
Low phos. plates, 12 in. and under	21.75 to 22.25
Cast iron borings	9.50 to 10.00
Short shov. turnings..	11.00 to 11.50
Machine shop turn....	8.50 to 9.00
Rerolling rails	18.25 to 18.75
Steel rails under 3 ft...	19.50 to 20.00
Steel rails under 2 ft...	21.50 to 22.00
Angle bars, steel.....	20.00 to 20.50
Cast iron carwheels ..	18.00 to 18.50
Railroad malleable ...	20.00 to 20.50
Agric. malleable	15.50 to 16.00
	Per Net Ton
Iron car axles	20.50 to 21.00
Steel car axles	$19.50 to $20.00
No. 1 RR. wrought....	16.50 to 17.00
No. 2 RR. wrought....	15.75 to 16.25
No. 2 busheling, old..	6.75 to 7.25
Locomotive tires	14.00 to 14.50
Pipes and flues	11.00 to 11.50
No. 1 machinery cast..	15.50 to 16.00
Clean auto. cast	14.75 to 15.25
No. 1 railroad cast ..	14.50 to 15.00
No. 1 agric. cast	12.50 to 13.00
Stove plate	10.00 to 10.50
Grate bars	11.50 to 12.00
Brake shoes	12.00 to 12.50

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng. steel.	$17.50 to $18.00
No. 2 hvy. mltng. steel.	16.50 to 17.00
Scrap rails	17.50 to 18.00
New hy. b'ndled sheets	16.50 to 17.00
Old hydraul. bundles ..	13.50 to 14.00
Drop forge flashings ..	16.50 to 17.00
No. 1 busheling	16.50 to 17.00
Hvy. axle turnings....	11.00 to 11.50
Machine shop turn....	11.50 to 12.00
Knuckles & couplers..	20.50 to 21.00
Coil & leaf springs....	20.50 to 21.00
Rolled steel wheels....	20.50 to 21.00
Low phos. billet crops.	20.50 to 21.00
Short shov. turnings..	11.50 to 12.00
Mixed bor. & turn.....	11.50 to 12.00
Cast iron borings	11.50 to 12.00
Steel car axles	20.50 to 21.00
No. 1 machinery cast..	16.25 to 16.75
No. 1 cupola cast	15.50 to 16.00
Stove plate	13.00 to 13.50
Steel rails under 3 ft...	19.00 to 19.50
Cast iron carwheels...	16.00 to 16.50
Railroad malleable	18.50 to 19.00
Chemical borings	10.50 to 11.00

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel.....	$12.50 to $13.00
Scrap steel rails	12.50 to 13.00
Short shov. turnings..	.... 8.00
Stove plate	.... 8.50
Steel axles	.... 15.00
Iron axles	.... 15.00
No. 1 RR. wrought....	.... 10.00
Rails for rolling	.... 14.00
No. 1 cast	.... 13.50
Tramcar wheels	.... 13.00

ST. LOUIS

Dealer's buying prices per gross ton delivered to consumer:

Selected hvy. steel....	$16.00 to $16.50
No. 1 hvy. melting....	15.50 to 16.00
No. 2 hvy. melting....	14.25 to 14.75
No. 1 locomotive tires..	15.00 to 15.50
Misc. stand.-sec. rails.	16.75 to 17.25
Railroad springs	18.25 to 18.75
Bundled sheets	9.50 to 10.00
No. 2 RR. wrought ...	15.50 to 16.00
No. 1 busheling	8.50 to 9.00
Cast bor. & turn.....	5.50 to 6.00
Rails for rolling	17.25 to 17.75
Machine shop turn....	4.00 to 4.50
Heavy turnings	10.50 to 11.00
Steel car axles	19.00 to 19.50
Iron car axles	19.50 to 20.00
No. 1 RR. wrought	13.50 to 14.00
Steel rails under 3 ft..	17.00 to 17.50
Steel angle bars	16.25 to 16.75
Cast iron carwheels...	15.25 to 15.75
No. 1 machinery cast.	13.00 to 13.50
Railroad malleable	15.50 to 16.00
No. 1 railroad cast....	13.25 to 13.75
Stove plate	7.50 to 8.00
Agricul. malleable	12.50 to 13.00
Grate bars	10.50 to 11.00
Brake shoes	13.00 to 13.50

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$15.00 to $16.00
No. 2 hvy. mltng. steel.	12.75 to 13.25
Scrap rails for mltng..	15.50 to 16.00
Loose sheet clippings.	9.50 to 10.00
Bundled sheets	11.50 to 12.00
Cast iron borings	7.50 to 8.00
Machine shop turns ..	8.50 to 9.00
No. 1 busheling.....	12.00 to 12.50
No. 2 busheling.....	7.50 to 8.00
Rails for rolling	16.00 to 16.50
No. 1 locomotive tires..	13.75 to 14.25
Short tails	18.75 to 19.25
Cast iron carwheels ..	14.75 to 15.25
No. 1 machinery cast..	15.75 to 16.25
No. 1 railroad cast	14.75 to 15.25
Burnt cast	10.75 to 11.25
Stove plate	10.75 to 11.25
Agricult. malleable ...	14.75 to 15.25
Railroad malleable	16.25 to 16.75

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$14.50 to $15.00
No. 2 hvy. mltng. steel.	13.75 to 14.25
Borings and turnings.	10.50 to 11.00
Long turnings	9.75 to 10.25
Short shov. turnings..	11.00 to 11.50
No. 1 machinery cast..	15.00 to 15.50
Automotive cast	15.00 to 15.50
Hydraul. comp. sheets.	15.50 to 16.00
Stove plate	9.00 to 9.50
New factory bushel...	14.75 to 15.25
Old No. 2 busheling ..	9.00 to 9.50
Sheet clippings	11.50 to 12.00
Flashings	14.00 to 14.50
Low phos. plate scrap.	15.75 to 16.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel.	$10.75	$10.50
No. 2 hvy. mltng. steel.	9.75	9.25
Mixed dealers steel	7.75	7.75
Scrap pipe	6.75	6.50
Steel turnings	4.25	4.25
Cast iron turnings	4.75	4.50
Machinery cast	11.75	11.00
Dealers cast	10.75	10.00
Stove plate	7.25	6.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$18.50 to $19.00
Hydraulic bund'es	18.25 to 18.75
Machine shop turn....	14.00 to 14.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$12.00 to $12.50
No. 2 hvy. mltng. steel.	11.00 to 11.50
Hvy. breakable cast...	12.00 to 12.50
No. 1 machinery cast.	12.50 to 13.00
No. 2 cast	11.00 to 11.50
Stove plate	9.75 to 10.25
Steel car axles	18.00 to 19.00
Shafting	17.00 to 18.00
No. 1 RR. wrought ...	12.00 to 12.50
No. 1 wrought long....	11.00 to 11.50
Spec. iron & steel pipe	10.50 to 11.00
Forge fire	9.50 to 10.00
Rails for rolling	13.50 to 14.00
Short shov. turnings..	6.00 to 6.50
Machine shop turn....	6.00 to 6.50
Cast borings	6.00 to 6.50
No. 1 blast furnace	6.00 to 6.50
Cast borings (chem.)..	10.00 to 11.00
Unprepar. yard scrap.	6.00 to 6.50

Per gross ton, delivered local foundries:

No. 1 machn. cast.....	$14.50 to $15.00
No. 1 hvy. cast cupola.	12.00 to 12.50
No. 2 cast	11.00 to 11.50

Add 25c. to 50c. above quotations to secure North Jersey prices.

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$12.40 to $12.90
Scrap rails	12.50 to 13.00
No. 2 steel	10.90 to 11.15
Breakable cast	11.50 to 11.80
Machine shop turn.....	7.65 to 8.15
Unmixed bor. & turn..	6.10 to 6.25
Bund. skeleton long....	.... 11.65
Shafting	16.30 to 16.50
Cast bor. chemical.....	6.00 to 7.00

Per gross ton delivered consumers' yards:

Textile cast	$13.00 to $13.75
No. 1 machine cast ..	.... 13.50
Stove plate.....	9.50 to 10.00

EXPORT

Dealers' buying prices per gross ton:

New York, delivered alongside barges	
No. 1 hvy. mltng. steel.	.... $12.50
No. 2 hvy. mltng. steel.	.... 11.50
No. 2 cast	.... 11.00
Stove plate	.... 10.00
Rai's (scrap)	.... 12.50
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel.	$13.00 to $13.25
No. 2 hvy. mltng. steel.	12.00 to 12.25
Rails (scrap)	13.00 to 13.50
Stove plate	7.75 to 8.00
New Orleans, on cars at Stuyvesant Dock	
No. 1 hvy. mltng. steel.	$12.60 to $12.75
No. 2 hvy. mltng. steel.	11.60 to 11.75
Los Angeles, on cars or trucks at local piers	
No. 1 hvy. mltng. steel.	$10.50 to $11.00
Compressed bundles ..	8.50 to 9.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$34.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.80c.

Wire Rods
(No. 5 to 15/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$43.00
F.o.b. Chicago, Youngstown or Anderson, Ind.	44.00
F.o.b. Worcester, Mass.	45.00
F.o.b. Birmingham	46.00
F.o.b. San Francisco	52.00
F.o.b. Galveston	49.00

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.20c.
F.o.b. Chicago or Gary	2.25c.
F.o.b. Duluth	2.35c.
Del'd Detroit	2.35c.
F.o.b. Cleveland	2.25c.
F.o.b. Buffalo	2.30c.
Del'd Philadelphia	2.51c.
Del'd New York	2.55c.
F.o.b. Birmingham	2.35c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars Pacific ports	2.75c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	2.05c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	2.10c.
F.o.b. Buffalo	2.15c.
F.o.b. Birmingham	2.20c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.60c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	2.25c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.30c.
Del'd Detroit	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.65c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	2.10c.
F.o.b. Buffalo, Cleveland Youngstown, Chicago, Gary or Birmingham	2.15c.
F.o.b. cars dock Gulf ports	2.50c.
F.o.b. cars dock Pacific ports	2.50c.

Iron

F.o.b. Chicago	2.15c.
F.o.b. Pittsburgh (refined)	3.25c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.55c.
F.o.b. Cleveland, Chicago and Gary	2.60c.
F.o.b. Buffalo	2.65c.
Del'd Detroit	2.70c.
Del'd eastern Michigan	2.75c.

* In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago or Gary	2.10c.
Del'd Cleveland	2.235c.
F.o.b. Coatesville or Spar. Pt.	2.15c.
Del'd Philadelphia	2.24c.
Del'd New York	2.34c.
F.o.b. Birmingham	2.20c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.60c.
Wrought iron plates, f.o.b. Pittsburgh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.60c.
F.o.b. Chicago	3.65c.
F.o.b. Coatesville	3.70c.
F.o.b. cars dock Gulf ports	4.00c.
F.o.b. cars dock Pacific ports	4.15c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
Del'd Cleveland	2.235c.
F.o.b. Buffalo or Bethlehem	2.15c.
Del'd Philadelphia	2.265c.
Del'd New York	2.3125c.
F.o.b. Birmingham (standard)	2.20c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.60c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.40c.
F.o.b. Chicago or Buffalo	2.50c.
F.o.b. cars dock Gulf or Pacific Coast ports	2.85c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb. per gross ton	$39.00
Angle bars, per 100 lb.	2.55c. to 2.70c.

F.o.b. Basing Points

Light rails (from billets) per gross ton	$38.00
Light rails (from rail steel) per gross ton	37.00

	Base per 100 Lb.
Spikes	2.90c.
Tie plates, steel	2.10c.
Tie plates, Pacific Coast ports	2.20c.
Track bolts, to steam railroads	4.00c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-10 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.15c.
No. 10, f.o.b. Gary	2.25c.
No. 10, del'd Detroit	2.35c.
No. 10, del'd Philadelphia	2.46c.
No. 10, f.o.b. Birmingham	2.30c.
No. 10, f.o.b. cars dock Pacific ports	2.70c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.80c.
No. 24, f.o.b. Gary	2.90c.
No. 24, del'd Detroit	3.00c.
No. 24, del'd Philadelphia	3.11c.
No. 24, f.o.b. Birmingham	2.95c.
No. 24, f.o.b. cars dock Pacific ports	3.45c.
No. 24, wrought iron, Pittsburgh	4.50c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.80c.
No. 10 gage, f.o.b. Gary	2.90c.
No. 10 gage, f.o.b. Detroit	3.00c.
No. 10 gage, del'd Philadelphia	3.11c.
No. 10 gage, f.o.b. Birmingham	2.95c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.40c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.25c.
No. 20 gage, f.o.b. Gary	3.35c.
No. 20 gage, del'd Detroit	3.45c.
No. 20 gage, del'd Philadelphia	3.56c.
No. 20 gage, f.o.b. Birmingham	3.40c.
No. 20 f.o.b. cars dock Pacific ports	3.80c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.40c.
No. 24, f.o.b. Gary	3.50c.
No. 24, del'd Philadelphia	3.71c.
No. 24, f.o.b. Birmingham	3.55c.
No. 24, f.o.b. cars dock Pacific ports	4.00c.
No. 24, wrought iron, Pittsburgh	5.15c.

Electrical Sheets
(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.70c.
F.o.b. Gary	3.80c.
F.o.b. cars dock Pacific ports	4.40c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.20c.
No. 20, f.o.b. Gary	3.30c.
No. 20, f.o.b. Birmingham	3.80c.
No. 20, f.o.b. cars dock Pacific ports	3.80c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.95c.
No. 28, Gary	3.05c.
No. 28, cars dock Pacific ports	3.55c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$4.85
Standard cokes, f.o.b. Gary	4.95

Above quotations practically the equivalent of previous quotations owing to new method of quoting, effective Jan. 1, 1937.

Special Coated Manufacturing Ternes
Manufacturing Ternes

	Per Base Box
F.o.b. Pittsburgh	*$4.15
F.o.b. Gary	* 4.25

* Customary 7½ per cent discount in effect through 1936 discontinued as of Jan. 1, 1937.

Terne Plate
(F.o.b. Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	2.15c.
All widths up to 24 in., Chicago	2.25c.
All widths up to 24 in., del'd Detroit	2.35c.
All widths up to 24 in., Birmingham	2.30c.
Cooperage stock, Pittsburgh	2.25c.
Cooperage stock, Chicago	2.35c.

Cold-Rolled Strip*

	Base per Lb.
F.o.b. Pittsburgh	2.85c.
F.o.b. Cleveland	2.85c.
Del'd Chicago	3.145c.
F.o.b. Worcester	3.05c.

* Carbon 0.25 and less.

Cold-Rolled Spring Steel

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	2.85c.	3.05c.
Carbon	.51- .75	3.70c.	3.90c.
Carbon	.76-1.00	5.45c.	5.65c.
Carbon Over	1.00	7.50c.	7.70c.

Fender Stock

No. 14, Pittsb'gh or Cleveland	3.10c.
No. 14, Worcester	3.50c.
No. 20, Pittsb'gh or Cleveland	3.50c.
No. 20, Worcester	3.90c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Spring wire	3.20c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.25
Smooth coated nails	2.25

	Base per 100 Lb.
Annealed fence wire	$2.90
Galvanized fence wire	3.30
Polished staples	2.95
Galvanized staples	3.20
Barbed wire, galvanized	2.75
Twisted barbless wire	2.75
Woven wire fence, base column	63.00
Single loop bale ties, base column	55.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel In.	Black	Galv.	*Wrought Iron* In.	Black	Galv.
⅛	57	37	⅛	..+91½	+138
¼ to ⅜	.60	44½	¼ & ⅜	+1½	+21½
½	....64½	55	½	....31½	15
¾	....67½	59	¾	....36½	20½
1 to 3	..69½	61½	1 & 1¼	.39½	25½
			1½	....43½	28
			2	....41½	26

Lap Weld

2	62	53½	2	37	22½
2½ to	3.65	56½	2½ to 3½	38	25
3½ to	6.67	58½	4 to 8	..40	28½
7 &	8.66	56½	9 to 12	..38	24½
9 &	10.65½	56			
11 &	12.64½	55			

Butt Weld, extra strong, plain ends

⅛	....55½	42½	⅛	...+13	+45½
¼ to ⅜	.57½	46½	¼ & ⅜	+2½	+34½
½	....62½	54½	½	....32½	17½
¾	....66½	58½	¾	....37½	22½
1 to 3	...68	61	1 to 2	..43½	29

Lap Weld, extra strong, plain ends

2	60	52½	2	40	26
2½ to	3.64	56½	2½ to	4.45½	33
3½ to	6.67½	60	4½ to	6.45	33½
7 &	8..66½	57	7 &	8.46	33
9 &	10..65½	56	9 to	12.41½	30
11 &	12..64½	55			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$ 7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.26	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	17.61	16.01
2¾ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	$21.45	$19.50
4½ in. o.d.	10 B.W.G.	41.08	37.35
3½ in. o.d.	11 B.W.G.	27.09	24.62
4 in. od.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.90

Extra for less-carload quantities:

25,000 lb.	or ft. to	39,999	lb.	or ft.	5 %
12,000 lb.	or ft. to	24,999	lb.	or ft.	12½ %
6,000 lb.	or ft. to	11,999	lb.	or ft.	25 %
2,000 lb.	or ft. to	5,999	lb.	or ft.	35 %
Under 2,000 lb.	or ft.				50 %

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago.	$50.00
6-in. and larger, del'd New York	48.00
*6-in. and larger, Birmingham	42.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	50.50
F.o.b. dock, Seattle	50.50
4-in., f.o.b. dock, San Francisco or Los Angeles	53.50
F.o.b. dock, Seattle	53.50

Class "A" and gas pipe, $3 extra.
4-in. pipe is $3 a ton above 6-in.

* Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $41, Birmingham, and $49.50, delivered Chicago; and 4-in. pipe, $44, Birmingham, and $52.40 a ton, delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. x 6 in. and smaller	70
Larger than ½ in.	65 and 10
Lag bolts	65 and 10
Plow bolts, Nos. 1, 2, 3, and 7 heads	65, 10 and 10
Hot-pressed nuts, blank or tapped, square	65 and 10
Hot-pressed nuts, blank or tapped, hexagon	65 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	65 and 10
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes	60, 20 and 5
Stove bolts in packages, nuts attached	72½
Stove bolts in packages, with nuts separate	72½ and 5
Stove bolts in bulk	81½

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland.	$3.25
F.o.b. Chicago or Birmingham.	3.35

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm.	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lbs. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $55 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	2.75c.
Delivered, Detroit	2.90c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (½% Nickel)	$0.25
2100 (1½% Nickel)	0.95
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30) Molybdenum (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.10c.
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.40
Carbon Vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric turned steel is 50c. higher. The differential for cold-drawn bars ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.25c. base per lb. Delivered Detroit, 3.40c.

STAINLESS STEEL No. 302

(17 to 19% Cr, 7 to 9% Ni, 0.08 to 0.20% C.)

(Base Prices f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	33c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.
Drawn wire	23c.

TOOL STEEL

	Base per Lb.
High speed	60c.
High carbon chrome	39c.
Oil hardening	22c.
Special	20c.
Extra	16½c.
Regular	13c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Based on Exchange rate as of Dec. 9

Ferromanganese, export	$44.10
Billets, open-hearth	28.78 to $31.01
Tin plate, per base box	4.59
Steel bars, open-hearth	38.59
Beams, open-hearth	37.36
Channels, open-hearth	38.59
Angles, open-hearth	37.36
Black sheets, No. 24 gage	53.87
Galvanized sheets, No. 24 gage	64.92

CONTINENTAL

Per Metric Ton, f.o.b. Continental Ports

Based on Exchange rate of Dec. 9

Billets, Thomas	$15.51
Wire rods, No. 5 B.W.G.	25.70
Steel bars, merchant	20.65
Sheet bars	15.79
Plate, ¼ in. and up	30.94
Plate, 3/16 in. and 5 mm.	26.36
Sheets, ⅛ in.	25.67
Beams, Thomas	17.82
Angles (Basic)	17.82
Hoops and strip, base	22.84
Wire, plain, No. 8	30.66
Wire nails	32.83
Wire, barbed, 4 pt. No. 10 B.W.G.	49.97

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH

	Base per Lb.
Plates	3.25c.
Structural shapes	3.25c.
Soft steel bars and small shapes	3.15c.
Reinforcing steel bars	3.15c.
Cold-finished and screw stock:	
Rounds and hexagons	3.60c.
Squares and flats	3.60c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	3.30c.
Hoops	3.80c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.45c.
Galv. sheets (No. 24), 25 or more bundles	4.05c.
Hot-rolled sheets (No. 10)	3.05c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.77
Spikes, large	3.25c.
	Per Cent Off List
Track bolts, all sizes, per 100 count	60
Machine bolts, 100 count	65-5
Carriage bolts, 100 count	65-5
Nuts, all styles, 100 count	65-5
Large rivets, base per 100 lb.	$3.65
Wire, black, soft ann'l'd, base per 100 lb.	3.15c.
Wire, galv. soft, base per 100 lb.	3.55c.
Common wire nails, per keg	2.50c.
Cement coated nails, per keg.	2.50c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.45c.
Soft steel bars, rounds	3.35c.
Soft steel bars, squares and hexagons	3.50c.
Cold-fin. steel bars:	
Rounds and hexagons	3.95c.
Flats and squares	3.95c.
Hot-rolled strip	3.40c.
Hot-rolled annealed sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.85c.
Spikes (keg lots)	4.00c.
Track bolts (keg lots)	5.10c.
Rivets, structural (keg lots)	4.10c.
Rivets, boiler (keg lots)	4.20c.
	Per Cent Off List
Machine bolts	*65
Carriage bolts	*65
Lag screws	*65
Hot-pressed nuts, sq. tap or blank	*65
Hot-pressed nuts, hex. tap or blank	*65
Hex. head cap screws	60
Cut point set screws	75 and 10
Flat head bright wood screws	62 and 20
Spring cotters	55
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.00 off list
Black ann'l'd wire per 100 lb.	$3.95
Com. wire nails, 50 kegs or more	2.50c.†
Cement c't'd nails, 50 kegs or more	2.50c.†

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants wihtin the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

†Prices for city and suburbs only.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.50c.
Structural shapes	3.47c.
Soft steel bars, rounds	3.51c.
Iron bars, Swed. charcoal	6.75c. to 7.00c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.06c.
Flats and squares	4.06c.
Cold-rolled; strip, soft and quarter hard	3.36c.
Hoops	3.66c.
Bands	3.66c.
Hot-rolled sheets (No. 10)	3.15c. to 3.41c.
Hot-rolled ann'l'd sheets (No. 24*)	3.75c. to 4.10c.
Galvanized sheets (No. 24*)	4.10c. to 4.50c.
Long terne sheets (No. 24)	5.25c. to 5.35c.
Armco iron, galv. (No. 24†)	5.65c.
Toncan iron, galv. (No. 24†)	5.65c.
Galvannealed (No. 24†)	5.75c.
Armco iron, hot-rolled annealed (No. 24†)	5.10c.
Toncan iron, hot-rolled annealed (No. 24†)	5.10c.
Armco iron hot-rolled (No. 10†)	4.15c.
Toncan iron, hot-rolled (No. 10†)	4.15c.
Cold-rolled sheets (No. 20) less than 1000 lbs.	
Standard quality	4.65c.
Deep drawing	5.40c.
Stretcher leveled	5.40c.
SAE, 2300, hot-rolled	6.97c.
SAE, 3100, hot-rolled	5.37c.
SAE, 6100, hot-rolled, annealed	9.57c.
SAE, 2300, cold-rolled	8.03c.
SAE, 3100, cold-rolled, annealed	7.43c.
Floor plate ⅛ in. and heavier	5.30c.
Standard tool steel	11.25c.
Wire, black annealed (No. 9)	3.50c.
Wire, galv. (No. 9)	3.85c.
Tire steel, 1 x ⅛ in. and larger	3.85c.
Open-hearth spring steel	4.00c. to 10.00c.
Common wire nails, base per keg	$3.21
	Per Cent Off List
Machine bolts, square head and nut:	
All diameters	65 and 10
Carriage bolts, cut thread:	
All diameters	65 and 10

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

† 125 lb. and more.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.55c.
Bars, soft steel (rounds and flats)	3.45c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.60c.
Cold-fin. rounds, shafting, screw stock	4.00c.
Hot-rolled annealed sheets (No. 24)	4.30c.
Galv. sheets (No. 24)	4.90c.
Hot-rolled sheets (No. 10)	3.40c.
Black corrug. sheets (No. 24)	4.30c.
*Galv. corrug. sheets	4.90c.
Structural rivets	4.15c.
Boiler rivets	4.25c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller.	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts; all quantities	65

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.30c.
*Structural shapes	3.30c.
*Soft steel bars, small shapes, iron bars (except bands)	3.45c.
‡Reinforc. steel bars, sq. twisted and deformed	3.21c.
Cold-finished steel bars	4.18c.
*Steel hoops	3.80c.
*Steel bands, No. 12 and 3/16 in. incl.	3.55c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	4.15c.
†Galvanized sheets (No. 24)	4.80c.
*Hot-rolled annealed sheets (No. 10)	3.40c.
Diam. pat. floor plates, ¼ in.	5.25c.
Swedish iron bars	6.25c.

These prices are subject to quantity differential except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 25 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.41c.
Soft steel bars	3.10c.
‡Reinforc. steel bars	2.10c.
†Cold-finished steel bars	3.75c.
Flat-rolled steel under ¼ in.	3.46c.
Cold-finished strip	†3.25c.
Hot-rolled annealed sheets (No. 24)	3.91c. to 4.31c.
Galvanized sheets (No. 24)	4.61c. to 4.91c.
Hot-rolled sheets (No. 10)	3.21c. to 3.41c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.46c.
*Black ann'l'd wire, per 100 lb.	$2.80
*No. 9 galv. wire, per 100 lb.	3.15
*Com. wire nails, base per keg	2.25

†Outside delivery 10c. less.

*For 5000 lb. or less.

‡Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.65c.
Floor plates	5.40c.
Bars, rounds, flats and angles.	3.55c.
Other shapes	3.70c.
Rail steel reinforc. bars	3.40c.
Hoops and bands, 3/16 in. and lighter	3.75c.
Cold-finished bars	4.15c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.05c.
Galv. sheets (No. 24) 3750 lb. or more	4.07c.
Galvanized sheets (No. 24) over 3500 lb.	4.07c.
Hot-rolled sheets (No. 10)	3.50c.
Cold-rolled sheets (No. 20) 3500 lb. or more	4.65c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.88
Com. wire nails, base per keg:	
Any quantity less than carload.	3.04
Cement c't'd nails, base 100-lb keg	3.50
Chain. lin. per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$20.37
4-in.	48.14
Lap-welded steel boiler tubes, 2-in.	19.38
4-in.	45.32

BUFFALO

	Base per Lb.
Plates	3.48c.
Struc. shapes	3.35c.
Soft steel bars	3.25c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq. Rounds and hex.	3.80c. 3.80c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.26c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.53c.
Galv. sheet (No. 24)	4.80c.
Bands	3.53c.
Hoops	3.53c.
Heavy top-rolled sheets	3.28c.
Com. wire nails, base per keg.	$2.85
Black wire, base per 100 lb. (2500-lb. lots or under)	4.00
(Over 2500 lb.)	3.90

BOSTON

	Base per Lb
Channels, angles	3.80c.
Tees and zees, under 3"	4.05c.
H beams and shapes	3.79c.
Plates — Sheared, tank, and univ. mill, ¼ in. thick and heavier	3.81c.
Floor plates, diamond pattern	5.61c.
Bar and bar shapes (mild steel)	3.80c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.95c. to 4.95c.
Half rounds, half ovals, ovals and bevels	5.05c.
Tire steel	5.05c.
Cold-rolled strip steel	2.60c.
Cold-finished rounds, squares and hexagons	4.30c.
Cold-finished flats	4.25c.
Blue annealed sheets, No. 10 ga.	3.95c.
One pass cold-rolled sheets No. 24 ga.	4.55c.
Galvanized steel sheets, No. 24 ga.	4.55c.
Lead coated sheets, No. 24 ga.	6.20c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.29c.
Structural shapes	3.52c.
Plates	3.52c.
Floor plates	5.27c.
Hot-rolled annealed sheets (No. 24)*	4.14c.
Hot-rolled sheets (No. 10)**	3.24c.
Galvanized sheets (No. 24)	4.82c.
Bands	3.49c.
Hoops	3.49c.
†Cold-finished bars	3.84c.
Cold-rolled strip	3.18c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.44c.

Bolts and nuts, in cases, 70 and 10 per cent off list
Broken cases..65 and 10 per cent off

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

* Base less 0.25c., 3500 lb. and over. Add 0.50c. per hundred lb. for broken bundles.

** Base less 0.25c., 1500 to 3749 lbs.; less 0.50c., 3750 to 7499 lb.; less 0.75c., 7500 lb. and over.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

Country territory to be equalized on the Chicago plan.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.41c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.31c.
Soft steel bars, squares and hexagons	3.46c.
Hot-rolled strip	3.51c.
Hot-rolled sheets (No. 10)	3.26c.
Hot-rolled annealed sheets (No. 24)	4.16c.
Galvanized sheets (No. 20)	4.76c.
Cold-finished steel bars	3.86c.
Cold-rolled strip	3.58c.
Structural rivets (keg lots)	4.01c.
Boiler rivets, cone head (keg lots)	4.11c.
Track spikes (keg lots)	4.06c.
Track bolts (keg lots)	5.06c.
Black annealed wire	3.60c.
Com. wire nails and cement coated nails	
1 to 14 kegs	2.75
15 kegs and over	2.65

	Per Cent Off List
Machine bolts and carriage bolts, ½x6 and smaller	65-10
Larger	65
Coach and lag screws	65
Hot-pressed nuts, sq. and hex. tapped or blank (keg lots)	65

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	3.45c.
Structural shapes	3.55c.
Plates	3.55c.
Cold-finished bars	4.00c.
Bands and hoops	3.65c.
Hot-rolled annealed sheets, No. 24	4.30c.
Galvanized sheets, No. 24	4.90c.

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	3.20c.
Structural shapes	3.10c.
Reinforcing bars	....prices on application
Plates	3.10c.
Hot-rolled sheets, No. 10	3.20c.
Bands	3.30c.
Hoops	3.55c.
Special threading steel	3.20c.
Diamond pattern floor plates ¼ in. and heavier	5.10c.
Galvanized bars and small shapes	5.70c.
Galvanized bands	5.80c.
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	3.88c.

All prices are for 2000 lb. and more.

For second zone add 10c. per 100 lb. for trucking.

List size extras of Aug. 15, 1935, and cutting extras to be added.

For cold-rolled products, list size extras from Jan. 1, 1936, and cutting extras to be added.

CHATTANOOGA

	Base per Lb.
Mild steel bars	3.46c.
Iron bars	3.46c.
Reinforcing bars	3.46c.
Structural shapes	3.66c.
Plates	3.66c.
Hot-rolled sheets No. 10	3.46c.
Hot-rolled annealed sheets, No. 24*	3.41c.
Galvanized sheets No. 24*	3.96c.
Steel bands	3.71c.
Cold-finished bars	4.281c.

* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	3.82c.
Shapes, bar size	3.82c.
Iron bars	3.82c.
Structural shapes	3.92c.
Plates	3.92c.
Hot-rolled sheets, No. 10	3.77c.
Hot-rolled annealed sheets, No. 24	4.67c.
Galvanized sheets, No. 24	5.27c.
Steel bands	4.02c.
Cold-drawn rounds	4.49c.
Cold-drawn flats, squares, hexagons	6.49c.
Structural rivets	4.25c.
Bolts and nuts, per cent off list	65
Small rivets, per cent off list	50

NEW ORLEANS

	Base per Lb.
Mild steel bars	3.45c.
Reinforcing bars	3.50c.
Structural shapes	3.65c.
Plates	3.65c.
Hot-rolled sheets, No. 10	3.65c.
Hot-rolled annealed sheets, No. 24	4.35c.
Galvanized sheets, No. 24	4.95c.
Steel bands	4.05c.
Cold-finished steel bars	4.55c.
Structural rivets	4.25c.
Boiler rivets	4.25c.
Common wire nails, base per keg	$2.45
Bolts and nuts, per cent off list	70

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.60c.	3.80c.	3.65c.
Shapes, standard	3.60c.	3.80c.	3.65c.
Soft steel bars	3.60c.	3.80c.	3.90c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.45c.	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.30c.	4.35c.	4.60c.
Hot-rolled sheets (No. 10)	3.70c.	3.90c.	3.85c.
Galv. sheets (No. 24 and lighter)	5.00c.	4.60c.	5.00c.
Galv. sheets (No. 22 and heavier)	5.00c.	4.80c.	5.00c.
Cold finished steel			
Rounds	6.05c.	6.10c.	6.00c.
Squares and hexagons	7.30c.	7.35c.	6.35c.
Flats	7.80c.	7.85c.	7.35c.
Common wire nails—base per keg less carload	$2.90	$2.90	$2.90

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
High-heat duty, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$48.00
High-heat duty, New Jersey	58.00
High-heat duty, Ohio	43.00
Intermediate, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	43.00
Intermediate, New Jersey	46.00
No. 1, Ohio	40.00
Ground fire clay, per ton	7.00

5 per cent trade discount on fire clay brick.

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$48.00
Chicago District	57.00
Birmingham	48.00
Silica cement per net ton	8.50

5 per cent trade discount on silica brick.

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$47.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	47.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester, Pa.	$67.00
Chemically bonded, f.o.b. Baltimore	57.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	42.00
Domestic, f.o.b. Chewelah, Wash.	24.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass. $22.75
F.o.b. Bethlehem, Birdsboro, and Swedeland, Pa., and Sparrows Point, Md. 21.50
Delivered Brooklyn 23.9289
Delivered Newark or Jersey City 22.9873
Delivered Philadelphia 22.3132
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill. 20.50
F.o.b. Jackson, Ohio 22.25
Delivered Cincinnati 20.82
F.o.b. Duluth 21.00
F.o.b. Provo, Utah 18.50
Delivered San Francisco, Los Angeles or Seattle 23.315
F.o.b. Birmingham* 16.88

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of .70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

F.o.b. Everett, Mass. $22.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md. 21.00
F.o.b. Buffalo 19.50
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill. 20.00
Delivered Cincinnati 19.82
Delivered Canton, Ohio 21.3482
Delivered Mansfield, Ohio.... 21.8832
F.o.b. Jackson, Ohio..... 21.75
F.o.b. Provo, Utah 18.00
F.o.b. Birmingham 15.50

Bessemer

F.o.b. Everett, Mass. $23.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa. 22.50
Delivered Boston Switching District 24.00
Delivered Newark or Jersey City 23.9873
Delivered Philadelphia 23.3132
F.o.b. Buffalo and Erie, Pa., and Duluth 21.50
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago 21.00
F.o.b. Birmingham 22.00
Delivered Cincinnati 22.0807
Delivered Canton, Ohio 22.3482
Delivered Mansfield, Ohio.... 22.8832

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $25.00

Gray Forge

Valley or Pittsburgh furnace.$20.00

Charcoal

Lake Superior furnace $23.00
Delivered Chicago 26.2528

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75....$21.00
No. 2 fdy., sil. 1.75 to 2.75.... 20.50
Malleable 22.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75.....$22.50
No. 2 fdy., sil. 1.75 to 2.25..... 22.00
Malleable 22.50
Basic 22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $80.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$26.00
50-ton lots 3-mo. shipment.. 24.00
F.o.b. New Orleans 26.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads) $69.50
50% (ton lots) 77.00
75% (carloads) 126.00
75% (ton lots) 136.00

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 6.00 to 6.50% $24.00

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10.00 to 10.50%.....$29.00
10.51 to 11.00%..... 29.50
11.00 to 11.50%..... 30.00
11.51 to 12.00%..... 30.50
12.01 to 12.50%..... 31.00
12.51 to 13.00%..... 31.50
13.01 to 13.50%..... 32.00
13.51 to 14.00%..... 32.50
14.01 to 14.50%..... 33.00
14.51 to 15.00%..... 33.50
15.01 to 15.50%..... 34.00
15.51 to 16.00%..... 34.50
16.01 to 16.50%..... 35.00
16.51 to 17.00%..... 35.50

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads..... $1.30
Ferrotungsten, lots of 5000 lb. 1.35
Ferrotungsten, smaller lots 1.40
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract ..... 10.00c.
Ferrochromium, 2% carbon .....16.50c. to 17.00c.
Ferrochromium, 1% carbon .....17.50c. to 18.00c.
Ferrochromium, 0.10% carbon .....19.50c. to 20.00c.
Ferrochromium, 0.06% carbon .....20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained V. .....$2.70 to $2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y. $2.50
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton $137.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton 142.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50
Ferrophosphorus, electric, 24%, in carlots, f.o.b. Anniston, Ala., per gross ton with $3 unitage, freight equalized with Nashville, Tenn. 75.00
Ferromolybdenum, per lb. Mo del. ..... 95c.
Calcium molybdate, per lb. Mo del. ..... 80c.
Silico spiegel, per ton, f.o.b. furnace, carloads $38.00
Ton lots or less, per ton.... 43.00
Silico-manganese, gross ton, delivered.
2.50% carbon grade..... 85.00
2% carbon grade 90.00
1% carbon grade 100.00

Note: Spot prices are $5 a ton higher except on 75 per cent ferrosilicon on which premium is $10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%...$4.80
Old range, non-Bessemer, 51.50% 4.65
Mesabi, Bessemer, 51.50%..... 4.65
Mesabi, non-Bessemer, 51.50%.. 4.50
High phosphorus, 51.50%..... 4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria.13.00c. to 13.50c.
Iron, low phos., Swedish, average, 68½% iron .....Nominal
Iron, basic or foundry, Swedish, aver. 65% iron .....10.00c.
Iron, basic or foundry, Russian, aver. 65% iron.....Nominal
Man., Caucasian, washed 52% .....27c. to 30c.
Man., African, Indian, 44-48% .....25c to 30c.
Man., African, Indian, 49-51% .....27c. to 30c.
Man., Brazilian, 46 to 48½% .....Nominal..25c. to 30c.

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid delivered nominal .....$15.25 to $15.50
Tungsten, domestic, scheelite delivered, nominal 15.00

Per Gross Ton

Chrome, 45% Cr_2O_3, lump, c.i.f. Atlantic Seaboard (African).$17.50
45 to 46% Cr_2O_3 (Turkish) $18.00 to 19.00
48% Cr_2O_3 (African)..... 20.50
48% min. Cr_2O_3 (Turkish) ..... 20.00 to 21.00
Chrome concentrate, 50% and over Cr_2O_3 c.i.f. Atlantic ports 22.00
52% Cr_2O_3 (Turkish) 23.00 to 24.00
48 to 49% Cr_2O_3 (Turkish) ..... 20.00 to 21.00

FLUORSPAR *Per Net Ton*

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail.....$18.00 to $19.00
Domestic, barge and rail ..... 18.50 to 19.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines..... 20.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid.... 23.00
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illnois and Kentucky mines.... 35.00

FUEL OIL *Per Gal.*

F.o.b. Bayonne or Baltimore No. 3 distillate ..... 4.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial ..... 3.75c.
Del'd Ch'go, No. 3 industrial 4.25c.
Del'd Ch'go, No. 5 industrial 3.90c.
Del'd Cleve'd, No. 3 distillate.. 6.00c.
Del'd Cleve'd No. 4 industrial 5.75c.
Del'd Cleve'd No. 5 industrial 5.00c.

COKE AND COAL

Coke *Per Net Ton*

Furnace, f.o.b. Connellsville, Prompt .....$4.00 to $4.25
Foundry, f.o.b. Connellsville, Prompt ..... 4.50 to 5.75
Foundry, by-product, Chicago ovens 9.00
Foundry, by-product, del'd New England ... 12.00
Foundry, by-product, del'd Newark or Jersey City ..... 9.60 to 10.05
Foundry, by-product, Philadelphia 9.85
Foundry, by-product, delivered Cleveland ... 10.30
Foundry, by-product, delivered Cincinnati .. 9.50
Foundry, Birmingham .. 6.50
Foundry, by-product, St. Louis, f.o.b. ovens. 8.00
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports 14.76

Coal *Per Net Ton*

Mine run steam coal, f.o.b. W. Pa. mines...$1.50 to $1.75
Mine run coking coal, f.o.b. W. Pa. ..... 1.75 to 1.90
Gas coal, ¾-in. f.o.b. Pa. mines ..... 2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines ..... 1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines ..... 1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines ..... 1.20 to 1.45

THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

. . . December orders heavy in nearly all centers; best of the year for some builders and distributors.

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. . . Railroad buying for rehabilitation of shops likely to be important feature of 1937 trade.

Cleveland

MACHINERY sales continue heavy and December business in this territory will be by far the largest of the year. One manufacturer of turret lathes has sold more machines this month than during any previous month in its history and the sales by this company have not been materially checked by a price advance which became effective early in the month. Deliveries are being rapidly extended with the heavy influx of orders and it has become a question of deliveries rather than price with many buyers. Additional changes in prices include advances of about 10 per cent by some of the lathe manufacturers to become effective early in January and an advance of 5 and 10 per cent respectively on two sizes of horizontal boring, drilling and milling machines by a Cleveland manufacturer, which was placed in immediate effect. The price advances have driven out orders in some cases for machines that had been pending a number of months. A sizable order for machine tool equipment both for the tool room and production work has been placed by the Timken Roller Bearing Co., Canton, Ohio. Seven of the machines were bought from one Cleveland distributor.

New York

MACHINE tool bookings continue high in the closing days of December, which for nearly all companies has been a very active month. General price increases throughout the month have served to bring in a number of orders which otherwise might have been withheld until after the first of the year. The demand as a whole, however, was healthy, and seemed to be inspired as much by actual needs as by higher prices. A large maker of screw and chucking machines announced, effective Dec. 17, a 9 per cent increase in price for machines and about 20 per cent for tooling and equipment. This particular company has booked 45 machines up to Dec. 19. Prices of radial drills, grinding machinery, drop hammers, hydraulic presses, and several other lines are expected to be announced after Jan. 1, since present prices are being quoted up to that date only. Contributing heavily to the necessity of advancing prices, according to representatives of manufacturers here, is the shortage of skilled labor in the plants. It is said that rejects of finished machines during inspection and complaints from owners after machines have been placed in service have been much greater in some organizations than ever before in their history. Relief and the necessity of decreasing the number of apprentices during the depression have been large factors in this shortage, according to some.

Pittsburgh

ANTICIPATION of holiday shutdowns last week slowed up orders somewhat. Many offices and plants closed down from Thursday evening until Monday morning. A steady stream of inquiries, however, continued up to the last minute, their volume only being surpassed by Christmas greetings. Dealers expect an exceptionally heavy volume of business to be transacted during the last week in the year, as customers make a final attempt to close contracts before Jan. 1. Brokers feel that the recent satisfactory pace of new business will continue unabated into 1937. High production rates at manufacturing plants have brought in equipment orders figured on by dealers some time ago.

Cincinnati

THE district machine tool market is still active. In the lighter tools, capacity has about been reached, but heavier equipment has not moved so rapidly. Planer and boring mill manufacturers, however, report improved demand and believe the uptrend, now sustained for the past two months, is definitely begun. Orders are for one and two units, but the total volume is good. Labor is still a problem, but management is maintaining a conservative policy to insure steady production.

Chicago

PRICE advances are coming rapidly; some for immediate effect and others for quotations after Jan. 1. These changes range from 10 to 15 per cent. Builders, though announcing higher prices, are wary of making quotations for preliminary study on machine tools which cannot be delivered until spring, caution being necessary because of uncertainty of the then prevailing material and labor costs. New buying is active as users rush in to take protection at old prices. Even the railroads are placing orders well ahead of their plans a month ago. The Santa Fe is inquiring for three 4-ft. radial drills, two 6-ft. radial drills and a 24-in. lathe.

Detroit

HOLIDAY week slowed up activity in the Detroit machinery market, although inquiries continue plentiful. Little closing is expected until early January. This is particularly true of job shops, which are refiguring budgets for tool and die machinery on the basis of prices recently revised upward. Sizable press orders are also expected in January. As a hedge against labor troubles in parts plants, some equipment is being bought by car manufacturers to make at least a fraction of requirements heretofore secured from outside sources. Ford is particularly active in this connection.

Timken Buys $300,000 Worth of Machinery

TIMKEN ROLLER BEARING CO., Canton, Ohio, has announced the placing of orders totaling $300,000 with various machine tool builders for new machinery and tools to increase its capacity to produce bearings for locomotives and rolling stock.

A review of the American machinery industries has been prepared by the machinery and marketing research division of the Bureau of Foreign and Domestic Commerce, and is available from the Superintendent of Documents, Washington, for 10c. per copy. The 55-page publication was prepared for the purpose of presenting a broad picture of the machinery industries linked together as to employment and payrolls, size of establishments, earnings, obsolescence, marketing and distribution methods and channels, foreign trade, etc., with accompanying tables and charts, and a list of books and publications of particular interest to the industry.

PLANT EXPANSION AND EQUIPMENT BUYING

. . . Hartford Electric Light Co., Hartford, plans an addition to South Meadows generating station to cost $3,500,000 with equipment.

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. . . Container Corp. of America, Chicago, plans an expenditure of about $6,000,000 for a pulp and paperboard mill at Fernandina, Fla.

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. . . Burroughs Adding Machine Co., Detroit, has asked bids on a new plant at Plymouth, Mich., costing close to $500,000.

NORTH ATLANTIC

Union Bag & Paper Corp., Woolworth Building, New York, manufacturer of kraft paper products, has let general contract to Merritt-Chapman & Scott Corp., 17 Battery Place, for third unit of new mill at Hermitage Plantation, Savannah, Ga., comprising large group of one and multi-story buildings. Cost close to $3,000,000 with machinery. Same contractor secured award for first two plant units and has work under way on second unit, scheduled for completion early in 1937, when work will begin on final unit. Entire project will represent investment of about $10,000,000. George F. Hardy, 305 Broadway, New York, is consulting engineer.

Coca-Cola Bottling Co. of New York, 431 East 165th Street, New York, plans new one-story mechanical-bottling plant at Grove Street and Broadway, Newburgh, N. Y., where tract recently was acquired. Cost close to $65,000 with equipment.

Steinmetz Construction Co., 565 Fifth Avenue, New York, has filed plans for new one-story machine shop, 50 x 100 ft. Cost close to $30,000 with equipment. Moore & Landsiedel, New York, are architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 5 for motor-driven pumping units and spare parts (Schedule 9540), one motor-driven radial drill (Schedule 9521) for Brooklyn Navy Yard; until Jan. 8, parts for airplanes (Schedule 900-333) for New York, Philadelphia or Norfolk yards.

American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, has let general contract to Fiske-Carter Construction Co., Masonic Temple Building, Greenville, S. C., for two-story and basement addition to branch plant at Valdosta, Ga. Cost about $100,000 with equipment.

G. Krueger Brewing Co., 531 West Eighteenth Street, New York, plans extensions and improvements in brewery, including multi-story addition for storage and distribution, and remodeling and improving of brew-house, with installation of additional equipment. Company is arranging for sale of 50,000 shares of common stock, considerable portion of fund to be used for purpose noted.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until Jan. 15 for 120,000 ft. of submarine mine cable (Proposal 95).

National Can Co., Inc., 110 East Forty-second Street, New York, has plans for new three-story storage and distributing plant on site, 125 x 200 ft., at Maspeth, L. I., for which superstructure will begin soon. Cost about $150,000 with equipment.

Oldtyme Distilleries Corp., 122 East Forty-second Street, New York, plans extensions and improvements in distilling plant at Penn Yan, N. Y., including additional equipment. Cost close to $50,000 with machinery.

Department of Sanitation, City of New York, 125 Worth Street, plans one-story mechanical shop and service building at 32 Goerck Street. Cost about $45,000 with equipment. F. B. McDuffee, architect for department, is in charge.

Harold Gottfried, Kingston, N. Y., brewer, has acquired plant of White Rock Mineral Springs Co., Ellenville, N. Y., comprising about 50 acres, with part improved with three-story building, about 90,000 sq. ft. floor space. New owner will remodel structure for branch brewery, to include additional equipment. Cost over $50,000 exclusive of property purchase.

Hamilton Millwork Co., Oregon Avenue and Gray Street, Paterson, N. J., manufacturer of sash, doors and other millwork products, plans rebuilding part of plant recently destroyed by fire. Loss close to $400,000 with equipment.

Passaic Rubber Co., Clifton, N. J., manufacturer of mechanical rubber specialties, molded rubber goods, etc., has approved plans for one-story addition. Cost over $45,000 with equipment. Huesmann, Dynes & Osborne, 13 Orient Way, Rutherford, N. J., are architects.

Atlantic Refining Co., 260 South Broad Street, Philadelphia, asks bids until Jan. 15 for five 100,000-gal. steel tanks, with pontoon floating roofs, for new bulk oil storage and distributing plant at Cliffs, near Wilmington, N. C. Entire plant will be equipped with steel tank capacity of 4,000,000 gal. at one time, including pumping station, building units, etc. Cost over $800,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 5 for 52,600 ft. of flame-proof single cable (Schedule 9505) for Philadelphia and Mare Island Navy Yards; two motor-driven upright drilling and tapping machines (Schedule 9530) for Philadelphia yard.

Baker-Layton Machine Co., Inc., Wilmington, Del., recently organized to take over George W. Baker Machine Co., 218 French Street, manufacturer of machinery and parts, has leased building at Second and Lombard Streets for plant. Harry B. Layton is president.

BUFFALO DISTRICT

Dunkirk Radiator Corp., Dunkirk, N. Y., plans one-story addition, 75 x 100 ft. Cost close to $50,000 with equipment.

City Chevrolet Co., Inc., 2585 Main Street, Buffalo, local representative for Chevrolet automobiles, has acquired building at Main Street and Fillmore Avenue, and will remodel for main service and repair plant, with storage and distributing division for parts and equipment. Cost close to $50,000 with equipment.

New York Central Electric Corp., Hornell, N. Y., an interest of Associated Gas & Electric System, New York, plans new steam-operated electric generating plant on Seneca Lake, near Dresden, N. Y. New transmission lines will be built, with high-tension power substations and switching facilities. Cost over $3,000,000.

SOUTH ATLANTIC

K. E. Stahl Mfg. Co., 921 South Blount Street, Greensboro, N. C., manufacturer of refrigerators, parts, etc., has acquired tract, 150 x 300 ft., in Fuller Heights district, for one-story plant, primarily for refrigerator assembling. Cost over $45,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 8 for spare parts for airplanes (Schedule 900-284) for Naval Air Station, Pensacola, Fla.

Container Corp. of America, Inc., 111 West Washington Street, Chicago, manufacturer of corrugated board boxes and containers, has let general contract to Merritt-Chapman & Scott Corp., 17 Battery Place, New York, for new pulp and paperboard mill at Fernandina, Fla. A power house, machine shop and other mechanical departments will be built. Cost close to $6,000,000 with equipment. George F. Hardy, 305 Broadway, New York, is consulting engineer. Walter P. Paepcke is president.

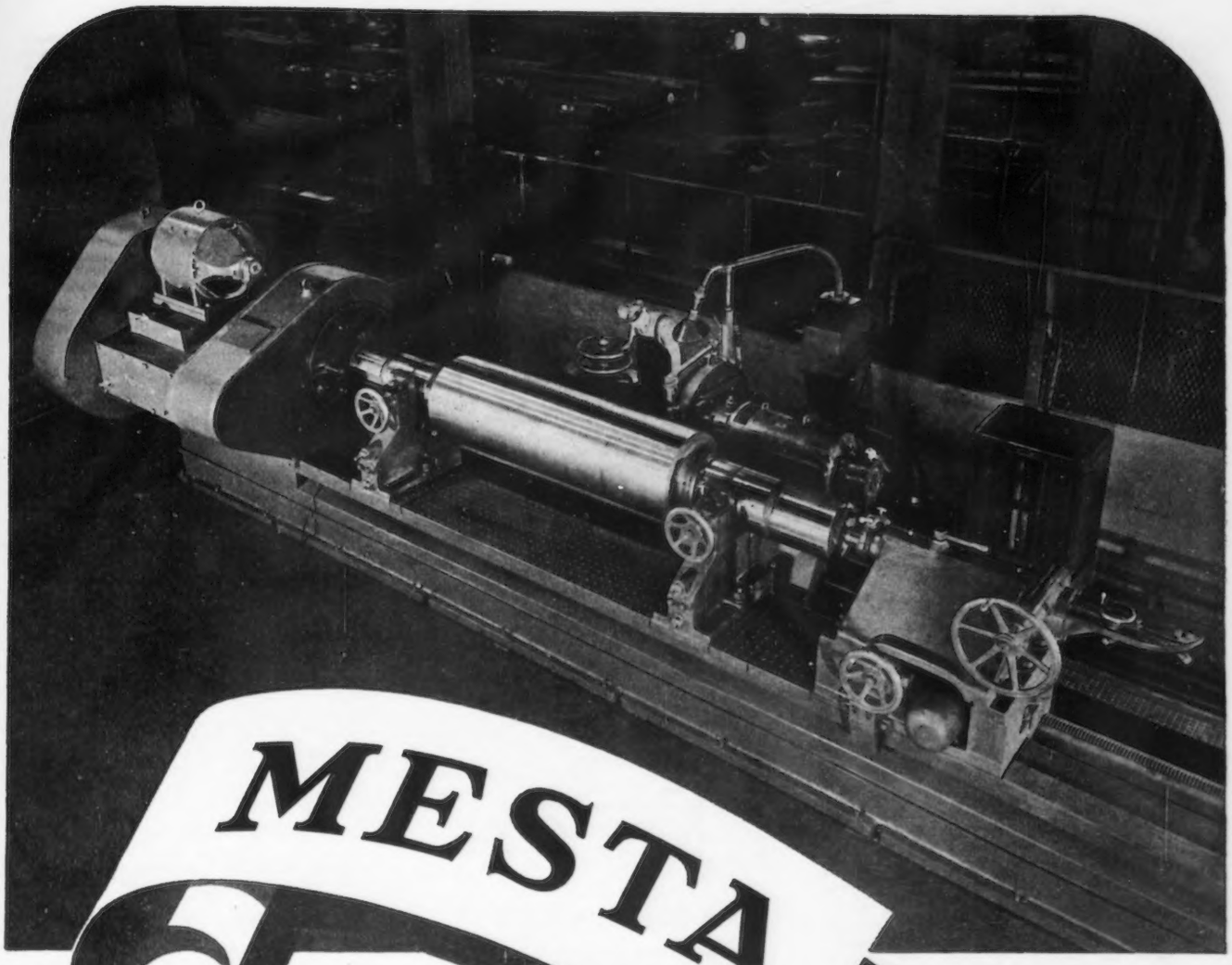
NEW ENGLAND

Torrington Co., Torrington, Conn., manufacturer of special machinery and parts, small metal goods, etc., has let general contract to Torrington Building Co., 182 Church Street, for two-story addition. Cost close to $50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 5 for four or five motor-driven engine lathes (Schedule 9517) for Boston Navy Yard.

Hartford Electric Light Co., Hartford, has engaged Stone & Webster Engineering Corp., 49 Federal Street, Boston, consulting engineer, to prepare plans for addition to South Meadows steam-electric generating station, with installation of new turbo-generator and auxiliary equipment. Cost close to $3,500,000.

E. C. Young Co., Randolph, Mass., manufacturer of portable garages, parts, etc.,



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MESTA MACHINE COMPANY · PITTSBURGH

plans rebuilding part of plant recently destroyed by fire. Loss over $75,000 with equipment.

Hampden Brewing Co., North Chicopee, Mass., has asked bids on general contract for one-story mechanical-bottling plant at Chicopee, Mass. Cost over $40,000 with equipment. McClintock & Craig, 458 Bridge Street, Springfield, Mass., are architects and engineers.

Armstrong Rubber Co., West Haven, Conn., manufacturer of automobile tires and other rubber products, has let general contract to E. & F. Construction Co., 94 Wells Street, Bridgeport, Conn., for three-story and basement addition, 80 x 180 ft. Cost about $100,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, is architect and engineer.

WASHINGTON DIST.

Chesapeake-Camp Corp., Franklin, Va., recently organized with capital of $3,500,000 by officials of Camp Mfg. Co., with local lumber mill, and other interests, has let general contract to Rust Engineering Co., Pittsburgh, for new kraft pulp and board mill at Franklin, near Camp plant, which will be used as source of raw material supply for pulp wood. New mill will cost close to $3,000,000 with machinery. Others interested are Albemarle Paper Mfg. Co., Richmond, Va., and Chesapeake Corp., West Point, Va., both of which are headed by H. W. Ellerson, who will be an official of new company. J. L. Camp, Jr., head of Camp Mfg. Co., will be president. J. E. Sirrine & Co., 215 South Main Street, Greenville, S. C., are supervising engineers.

Commanding Officer, Aberdeen Proving Grounds, Aberdeen, Md., asks bids until Jan. 11 for one steel rail carriage with track carrier for track and suspension testing course (Circular 48).

William Schluderberg-T. J. Kurdle Co., Baltimore and Eaton Streets, Baltimore, meat packer, has asked bids on general contract for one-story oil refinery unit. Cost over $65,000 with equipment. H. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

Owings Mills Distillery, Owings Mills, Md., has asked bids on general contract for two-story mechanical-bottling works. Cost over $50,000 with machinery. Kubitz & Koenig, Emerson Tower Building, Baltimore, are consulting engineers.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 5 for centrifugal pumps and spare parts (Schedule 9584), one tool room precision lathe and relieving attachments (Schedule 9518), one slip roll forming machine (Schedule 9504), one power squaring shear, all motor-driven (Schedule 9508); until Jan. 8, spare parts for airplanes (Schedule 900-302, 900-303 and 900-290), drive assemblies for aircraft engines (Schedule 900-310) for Eastern and Western yards; spare parts for airplanes (Schedule 900-302, spare parts for airplane propeller hubs (Schedule 900-309) for Sewall's Point yard.

SOUTH CENTRAL

Nelson County Distillery, Inc., Bardstown, Ky., has approved plans for new plant at Greenbrier, Ky., where tract has been secured, to include multi-story storage and distributing building, power house and other mechanical structures. Cost about $125,000 with equipment. J. E. Conway is head.

Marshall Stove Works, Lewisburg, Tenn., manufacturer of stoves and ranges, and parts, plans rebuilding part of plant recently destroyed by fire. Loss over $100,000 with equipment.

Sewerage and Water Board, New Orleans, will take bids soon for pumping machinery and auxiliary equipment for new station for municipal waterworks, including two main motor-driven pumping units, 50,000,000-gal. per day capacity and accessories. Cost about $215,000.

Chalmette Petroleum Corp., Chalmette, La., has awarded contract to Arthur G. McKee & Co., Cleveland, engineer and contractor, for design and construction of additions to oil refinery, including cracking machinery for expansion in gasoline division and other equipment, to double present capacity. Cost about $400,000 with equipment.

Common Council, Oxford, Miss., plans extensions and improvements in municipal electric power plant, including additional equipment. Cost about $55,000. Special election has been called Jan. 12 to approve bonds in amount noted.

Henry Fischer Packing Co., 1862 Mellwood Street, Louisville, meat packer, has let general contract to Snead Architectural Iron Works, Tenth and Hill Streets, for one-story addition for expansion in main plant and for addition to steam power building. Cost close to $65,000 with equipment.

WESTERN PA. DIST.

Spang, Chalfant & Co., Inc., Clark Building, manufacturer of steel tubing, piping, etc., has plans for one-story addition to plant at Ambridge, Pa. Cost over $150,000 with equipment.

Pennsylvania Electrical Repair Co., 129 First Avenue, Pittsburgh, operating a general electrical repair works, manufacturer of parts, etc., has acquired property at 1001-15 Sawmill Run Boulevard, as site for new one-story plant. Cost close to $75,000 with equipment.

Williams & Co., Inc., 901 Pennsylvania Avenue, Pittsburgh, metal products, steel tubing, etc., has let general contract to Rose & Fisher, 3215 McClure Avenue, for one-story shop addition, 100 x 100 ft., at 3125 Preble Avenue, Northside. Cost over $60,000 with equipment.

Beckley Creek Coal Co., Charleston, W. Va., John Laing, Kanawha Valley Bank Building, president, recently organized with capital of $500,000, plans steel tipple at mining properties in Raleigh County, W. Va., where mines will be developed for capacity of 3000 tons daily. Cost close to $100,000 with elevating, conveying, loading and other mechanical equipment.

SOUTHWEST

Fruehauf Trailer Co., 10940 Harper Avenue, Detroit, manufacturer of automobile trailers and parts, has leased buildings to be erected on six-acre tract in Fairfax industrial district, Kansas City, Kan., by Kansas City Industrial Land Co., Kansas City, Kan., comprising group of one-story units, totaling 100 x 565 ft., for new branch assembling works for semi-trailer production. Erection is scheduled to begin in February. Cost over $250,000 with equipment. Present sales and service branch of company at 721 West Pennway, Kansas City, Mo., will be continued as heretofore. Charles E. Keyser is architect for owner, noted.

White River Power Co., a subsidiary of Arkansas Power & Light Co., Pine Bluff, Ark., plans new hydroelectric generating plant at Wild Cat Bend on White River, Baxter and Marion counties, Ark., with initial installation of two hydraulic turbines of 38,000-hp. rated capacity each, and a third such unit to be installed later. Project will include power dam, generating station, transmission lines, high-tension power substation and connecting lines with system of parent company. Cost over $6,000,000.

Board of Education, Library Building, Kansas City, Mo., George C. Tinker, secretary, has let general contract to John E. Redmond, Railway Exchange Building, for one and three-story additions, 30 x 35 ft., and 65 x 68 ft., respectively, to mechanical shops and equipment storage and distributing building at Twenty-first and Charlotte Streets, including improvements in present unit. Cost about $60,000 with equipment. Nate W. Downes, Finance Building, is mechanical engineer.

Hamilton & Sons Canning Co., New London, Wis., food canner and packer, has approved plans for one-story branch plant at Corpus Christi, Tex. Cost close to $45,000 with equipment.

Board of Education, Gainesville, Tex., plans manual training department in new two-story high school, for which bids are being asked on general contract until Jan. 5. Cost about $175,000. Elmer G. Withers Architectural Co., Inc., Mid-Continent Building, Fort Worth, Tex., is architect.

OHIO AND INDIANA

Martin Brothers Electric Co., 1858 East Fortieth Street, Cleveland, manufacturer of electrical appliances and equipment, has acquired property at Perkins Avenue, N.E., and East Thirty-sixth Place, for new two-story plant, about 25,000 sq. ft. floor space, for which bids will be asked soon on general contract. Cost over $65,000 with equipment. W. L. Martin is president.

Cleveland Cap Screw Co., 2921 East Seventy-ninth Street, Cleveland, has let general contract to R. E. Nixon, 1820 Chapman Avenue, for one-story addition, 80 x 200 ft. Cost close to $60,000 with equipment. H. M. Morse, 1500 Superior Avenue, is engineer.

Perfection Burial Vault Co., Galion, Ohio, manufacturer of metallic caskets, bodies for dump trucks, etc., plans new one-story plant to replace works recently destroyed by fire. Loss over $400,000 with equipment. Another site will be selected; new works will cost close to amount of fire loss.

Ohio Edison Co., East High Street, Springfield, Ohio, plans addition to Mad River steam-operated electric generating plant, with installation of new turbo-generator units and auxiliary equipment to double present capacity. Extensions will be made in transmission lines. Entire project will cost close to $2,000,000.

Kelley Island Lime & Transport Co., Leader Building, Cleveland, is considering new stone-crushing plant at properties on Kelley Island, Sandusky, Ohio. Cost about $100,000 with machinery, including mechanical-handling and loading equipment. J. R. Schumaker is company engineer.

Contracting Officer, Material Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until Jan. 6 for 304,000 ft. aircraft cable and 180,000 ft. high-tension ignition cable (Circular 397); until Jan. 8, bushings, couplings, connectors, cones, elbows, flanges, nuts, nipples, sleeves, plugs, tees, etc. (Circular 392).

American Coating Mills, Elkhart, Ind., manufacturer of patented coated board products, box boards, etc., has let general contract to Ira C. Mast, Elkhart, for two one-story additions, 48 x 175 ft., and 36 x 73 ft., for expansion in pressing division, storage and distribution. Cost about $50,000 with equipment.

Coca-Cola Bottling Co., Anderson, Ind., has let general contract to Harry Kelly Co., Seventh and Brown Streets, for two-story addition and improvements in present unit. Cost close to $65,000 with equipment.

MICHIGAN DISTRICT

Burroughs Adding Machine Co., 6071 Second Boulevard, Detroit, has asked bids on general contract for initial units of new one-story plant on part of 140-acre tract at Plymouth, Mich., primarily for production of line of accessory products, including adding machine stands, metal furniture, etc. Cost close to $500,000 with equipment. Other units to be erected later will make total plant investment over $2,000,000. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer.

Ross Operating Valve Co., 6488 Epworth Boulevard, Detroit, manufacturer of valves and kindred specialties, will break ground soon for one-story addition, for which general contract recently was let to Bennage & McKinstrie, 4612 Woodward Avenue. Cost close to $30,000 with equipment.

Department of Public Works, City Hall Detroit, asks bids until Jan. 15 for four municipal incinerator plants in different parts of city, with furnaces, loaders, conveyors and other mechanical-handling equipment. Cost reported in excess of $1,500,000 with machinery.

L. A. Young Spring & Wire Corp., 9200 Russell Avenue, Detroit, will break ground at once for new one-story plant on 10-acre tract at Trenton, N. J., 200 x 540 ft., with power house, for which general contract recently was let to William C. Ehret, 209

Academy Street, Trenton. Cost close to $400,000 with equipment. Other units will be built on adjoining site later. Christian W. Brandt, Madison Theater Building, Detroit, is architect.

Aetna Portland Cement Co., Bay City, Mich., plans extensions and improvements in power house, including installation of coal-burning equipment, conveyors, steel bunkers, etc. S. Firestone, 59 South Avenue, Rochester, N. Y., is engineer.

MIDDLE WEST

J. L. Clark Mfg. Co., Twenty-third Avenue, Rockford, Ill., manufacturer of tin cans and containers, has let general contract to Security Building Co., 717 East Jefferson Street, for one-story addition, 125 x 125 ft. Other extensions are planned. Cost about $250,000 with equipment. Nimmons, Carr & Wright, 333 North Michigan Boulevard, Chicago, are architects and engineers.

Central Steel & Wire Co., 4545 South Western Avenue, Chicago, manufacturer of steel, brass, cooper, aluminum and other wire products, has purchased 15-acre tract in Kenwood industrial district for early expansion.

City Council, Beresford, S. D., plans extensions and improvements in municipal electric power plant, including additional equipment. Cost about $70,000. J. M. Engberg, Madison, S. D., is consulting engineer.

United States Engineer Office, Rock Island, Ill., asks bids until Jan. 17 for construction of Dam No. 17, Mississippi River, near New Boston, Ill., including 11 units of operating machinery, locomotive crane and other equipment.

Board of Works, City Hall, Des Moines, Iowa, plans one-story municipal service, repair and garage building at Ninth and Cherry Streets, for city-owned motor trucks and automobiles. Cost about $245,000 with equipment. Financing will be arranged through Federal aid.

Welcome Baking Co., Twelfth and Jackson Streets, Omaha, Neb., plans new one-story plant, 125 x 168 ft., at Davenport, Iowa, for which bids will be asked soon on general contract. Cost close to $75,000 with traveling ovens, conveyors and other mechanical-handling equipment. W. E. Long Co., 155 North Clark Street, Chicago, is engineer.

Barber-Greene Co., West Park Avenue, Aurora, Ill., manufacturer of conveying machinery, bucket loaders and kindred heavy equipment, has begun superstructure for one-story addition, 50 x 220 ft.

Universal Motor Co., Oshkosh, Wis., one of the oldest and largest manufacturers of marine engines, has been purchased from estate of E. Homer Fahrney, founder, by Ralph G. Klieforth, president and general manager, and a group of employees and associates. Mr. Klieforth joined the company in 1928 as advertising manager and was made general manager in 1932, becoming president in July, 1935. There will be no change in name, organization or policies of the company.

PACIFIC COAST

Lockheed Aircraft Corp., 1705 Victory Place, Burbank, Cal., has let general contract to J. V. McNeil & Co., 5860 Avalon Boulevard, Los Angeles, for one-story addition, 50 x 220 ft., primarily for an assembling works. Cost over $75,000 with equipment.

Grace Brothers Brewing Co., Santa Rosa, Cal., will take bids soon for one-story addition for expansion in malting division. Cost over $45,000 with equipment. L. H. Nishkian, 525 Market Street, San Francisco, is engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 5 for one motor-driven hand miller (Schedule 9526), three industrial, low platform electric trucks (Schedule 9503); until Jan. 8, one motor-driven drill press (Schedule 7102) for Mare Island Navy Yard; until Jan. 5, one motor-driven pipe and bolt threading and cutting machine (Schedule 9549), one motor-driven metal-cutting bandsaw (Schedule 9522); until Jan. 8, parts for airplanes (Schedule 900-346), blades, hubs and wheels for airplanes (Schedule 900-293) for San Diego Naval Station; until Jan. 5, one motor-driven disk grinder (Schedule 9525), 140 portable storage batteries (Schedule 9553) for Puget Sound Yard; steel forgings (Schedule 9582) for Puget Sound and Eastern yards; until Jan. 8, one motor-driven horizontal boring, drilling and milling machine and spare parts (Schedule 9229) for Puget Sound yard; spare parts for airplanes (Schedule 900,307 for Seattle yard.

Spokane County Rural Electric Cooperative, Inc., Plaza, Wash., recently organized, plans about 200 miles of transmission and distributing lines for rural electrification in parts of Spokane and Whitman counties, with service facilities; also will build new electric generating station for power supply. Fund of $290,000 has been secured through Federal aid.

Regal Amber Brewing Co., 675 Treat Avenue, San Francisco, has let general contract to C. L. Wold Construction Co., 3312 Fulton Street, for one-story addition, primarily for storage and distribution. Cost about $30,000 with equipment.

FOREIGN

Towner & Co., Ltd., London, England, manufacturer of paper products, has plans for new pulp and paper mill at Cardiff, Wales, where site has been acquired. It will include power house, machine shop, pumping station and other mechanical structures. Cost over $1,000,000 with machinery. Jervis, Hitchins & Co., Ltd., 3 Central Chambers, S.W., London, is engineer.

British Aluminium Co., Ltd., London, England, plans new works in Australia, where site is now being selected. Cost over $700,000 with equipment. A subsidiary has been organized under name of British Aluminium (Australia) Pty., Ltd., capitalized at $1,500,000, to carry out project.

Secretary, Public Works Tender and Supplies Committee, Department of Public Works, Wellington, New Zealand, asks bids until Jan. 26 for a 1-ton stop-log gantry crane, two-motor type, including motors, trolleys and complete accessories; until Feb. 16 for four 5000-kva. single-phase transformers, with auxiliary equipment.

American Management Association Warned Against "Boom Psychology"

THREE THOUSAND members of the American Management Association were warned not to allow themselves in the management of their businesses to be lulled into a state of false luxury by the present period of easing profits. In an editorial, appearing in the December issue of *The Management Review*, published by the association, Dr. Willard Thorp, director of economic research, Dun & Bradstreet, Inc., deplored the reappearance of "boom psychology" and advised business managers not to base expansion moves on the "easy profits of the day."

In recent months the association has made a studied effort to remind its members that lasting profits of the post-depression period would be gained only through conservative and sound business administration. "Management's worst problems come in periods of prosperity," said Alvin E. Dodd, president of the association, "and the worst job of all falls on the fellow who has to say 'go easy.'"

While acknowledging that the business upswing is here and gaining momentum each day, the editorial stated:

"Already there is evidence in isolated spots of the appearance of a 'boom psychology.' With expanding consumer purchasing power, interest rates low, and six years of enforced consumer economy behind us, some are seeing no limit to the current upswing. They are impressed by the fact that durable goods and luxury goods are recording extraordinary percentage increases, and that the stock market has risen for many months. There is a danger that we are headed for what a British professor calls 'a period of optimistic error.'

"It needs little argument to demonstrate that the problems of prosperity are more difficult than those of depression. Tests of real character are usually more severe under favorable than adverse conditions. Carelessness and waste are creatures of profitable times, not of depressions. No condition is more dangerous for a business man than a period of sustained high profits. Depression does not offer all those attractive invitations for expansion that prosperity provides. Furthermore, those who urge caution are scorned as unpatriotic or disloyal.

"The temptations of prosperity fall, of course, on the manager. The prevention of excesses is his job. As in the period of optimistic error which characterized the latter twenties, there will be alluring demands for expansion—expansion warranted only by the easy profits of the day, heedless of the prospects of the longer term. In the face of such pressure, the manager must be mindful of the threat of the next depression.

"For business, in general, the problem of recovery should be replaced by the problem of maintaining business health. Industry programs must have that as their new objective. And those larger organizations which cut across industry lines, must concern themselves with ways and means for prolonging the prosperity period.

"Probably the best resolve that managers can make today is that depression-created economies will not be too easily discarded, and that easing profits will not be permitted to create a fatal sense of luxury and business security."

A REVIEW OF CURRENT CATALOGS & CIRCULARS

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Variable Speed Reducers.—Reeves Pulley Co. Booklet, 32 pages, entitled "Speed Control at Work," briefly describes and illustrates use of the company's speed control by 12 nationally known manufacturers in as many different industries. A blue and gold suede cover together with full page bleed-border illustrations add to the unusual attractiveness of the booklet. *Bulletin 12-109.*

Air Compressors.—Union-C-Machine Co. Bulletin describing and illustrating Union-C air compressors and pneumatic accessories. *Bulletin 12-110.*

Adhesive. —Marbon Corp. Folder announcing new adhesives—strong, heavy-duty adhesive cement with many industrial uses. Various types explained and method of application provided. *Bulletin 12-111.*

Aluminum De-gaser. —Foundry Services. Circular explaining claimed means of perfecting aluminum castings. Directions for use included. *Bulletin 12-112.*

Furnace Brick. —William M. Bailey Co. Folder explaining, diagramming and illustrating "Superior" checkers. Technical data and claimed advantages are included. *Bulletin 12-113.*

Goggle Valves.—William M. Bailey Co. Folder explaining and diagramming valves for blast furnace, gas washer and boiler plant gas mains. *Bulletin 12-114.*

Drop Forging. —Kropp Forge Co. Folder illustrating and describing facilities for making drop forgings, die blocks, heat treating and machining. Illustrations are of plant and products. *Bulletin 12-115.*

Manganese Steel Pumps. —American Manganese Steel Co. Bulletin covering line of "Standard" and "Counterflow" pumps, pump fittings and cutter heads. Profusely illustrated and discusses the "Counterflow" principle. *Bulletin 12-116.*

Galvanized Sheets for Painting. —American Rolling Mill Co. Folder describing "Paintgrip" sheets, forming qualities, soldering practice, welding, cleaning and finishing operations. *Bulletin 12-117.*

Flexible Coupling. —Boston Gear Works, Inc. Leaflet describing and illustrating new flexible couplings. Symbol FCB. Price list included. *Bulletin 12-118.*

Water Power Machinery.—S. Morgan Smith Co. Illustrated folder describing and picturing Smith units to be installed at Bonneville Dam, Portland, Ore. *Bulletin 12-119.*

Aluminum Paint.—Aluminum Industries, Inc. 45-page booklet, profusely illustrated, showing applications of Permite ready-mixed aluminum paint. Includes chart showing types and physical properties for different applications. *Bulletin 12-120.*

Power Transmission Equipment. —Link-Belt Co. 208-page book containing specifications, descriptions and illustrations of line of power transmission equipment. Price lists also included. *Bulletin 12-121.*

Boilers. —Edge Moor Iron Works. Attractively presented catalog covering water tube boilers. Descriptions, illustrations and diagrams of boiler cross-sections are included. *Bulletin 12-122.*

Developments in Modern Drop Forging. —Chambersburg Engineering Co., Inc. Reprints available of paper on subject by R. E. W. Harrison, vice-president, Chambersburg Engineering Co. *Bulletin 12-123.*

Valveless Automatic Controllers. Johnston Mfg. Co. Bulletin describing temperature control by use of floating control system, or two-position control. Illustrations of installations, graphs included. *Bulletin 12-124.*

Gage Blocks.—Ford Motor Co. Small folder describing, illustrating and pricing Johansson gage blocks. *Bulletin 12-125.*

Rock Drill. —Worthington Pump & Machinery Corp. Bulletin describing and illustrating light-weight, mobile, all-purpose drill for quarries, road work, ditches and similar applications. *Bulletin 12-126.*

Magnetic Separators. —Stearns Magnetic Mfg. Bulletin No. 700 describing and illustrating line of type "K" separators which involve mainly ore concentration and purification. Detailed description of model is shown in an elevation outlining flow of material and action of the machine. *Bulletin 12-127.*

Controls For Machine Tools. —Square D Co. Fifteen-page booklet on the subject of machine tool control. Illustrated. Cycles of operations outlined. *Bulletin 12-128.*

Electric Furnace Elements. —Hevi Duty Electric Co. Bulletin HD636 describes hevi duty furnace element construction. *Bulletin 12-129.*

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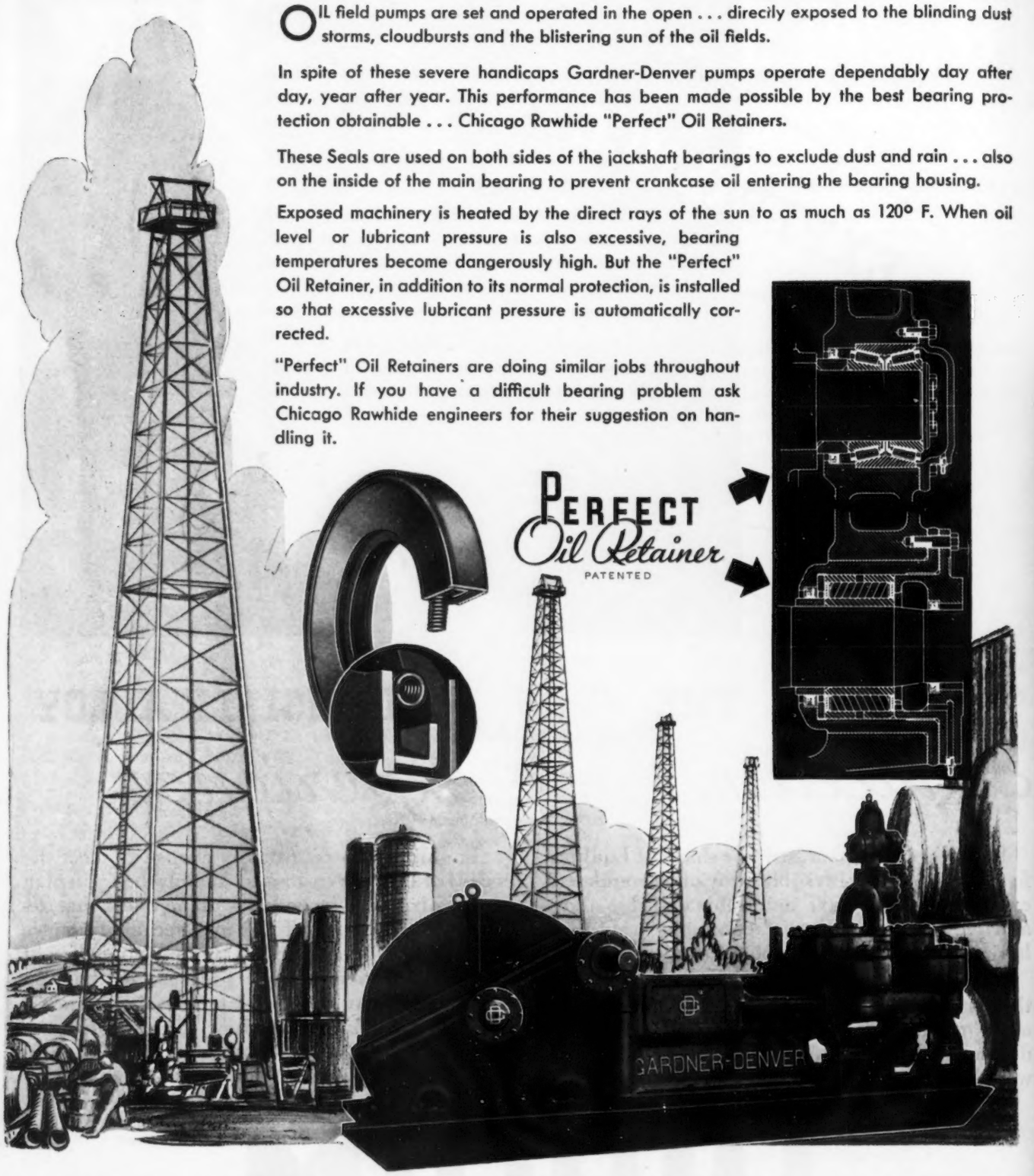

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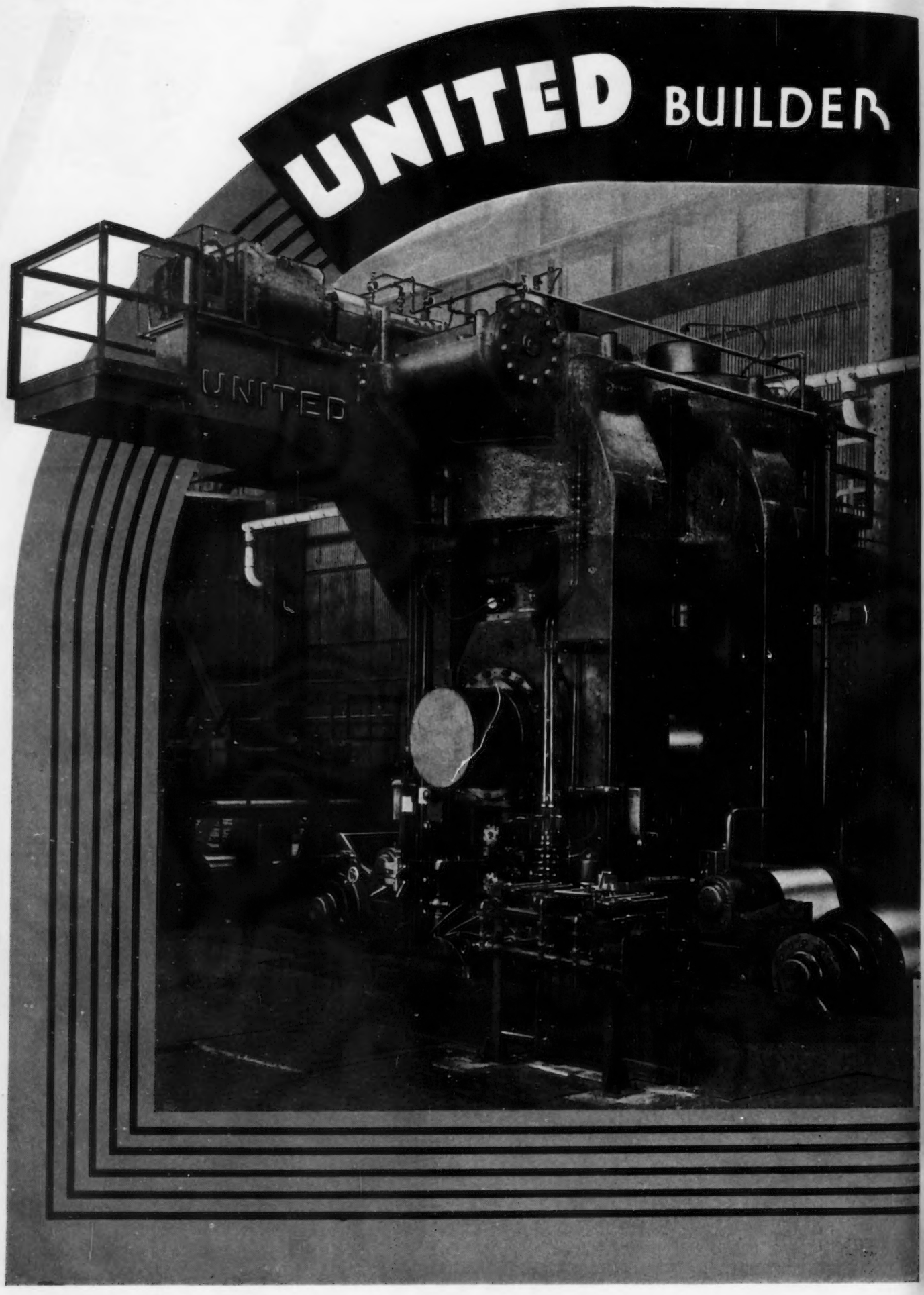
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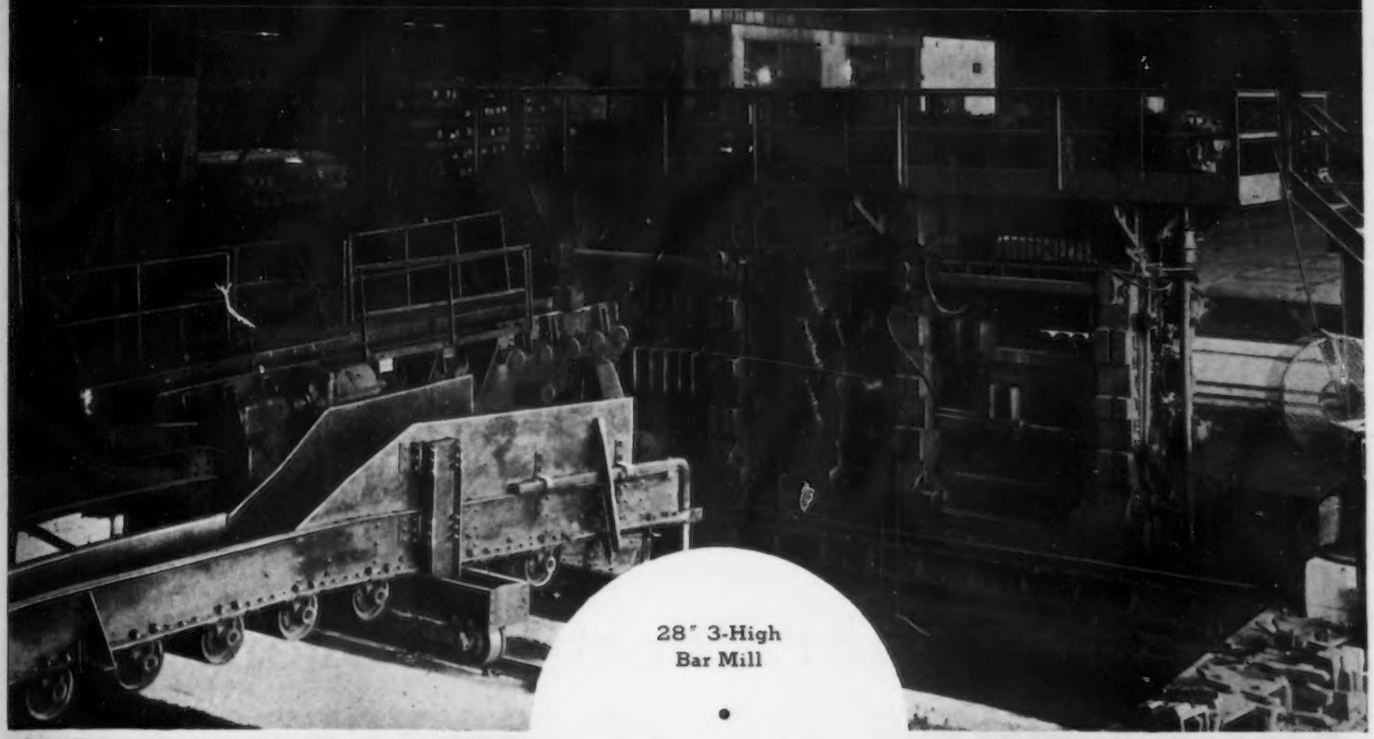

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54" Blooming Mill

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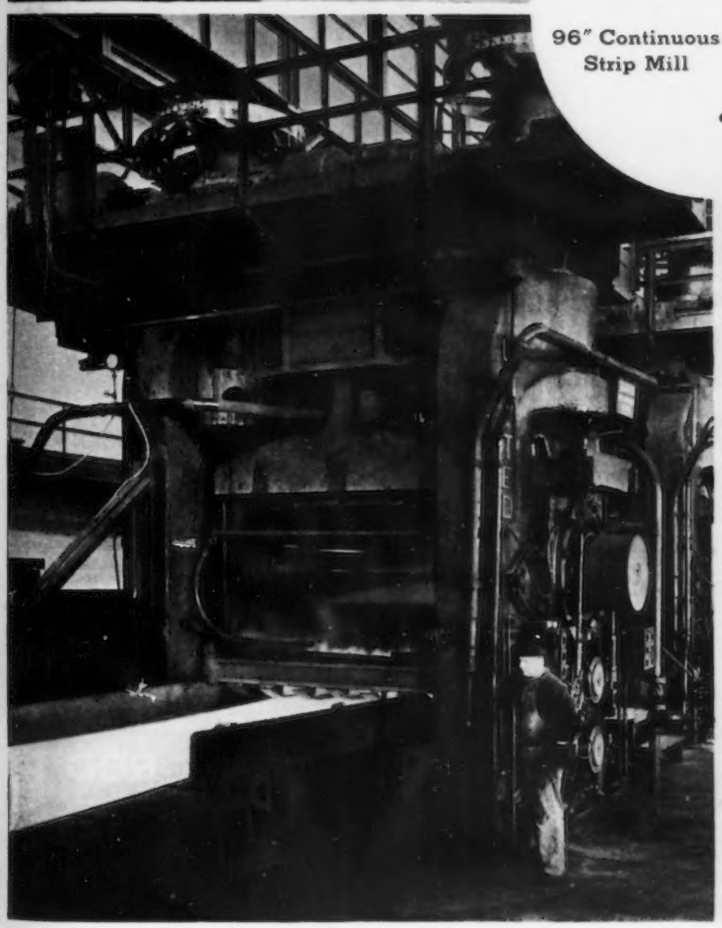

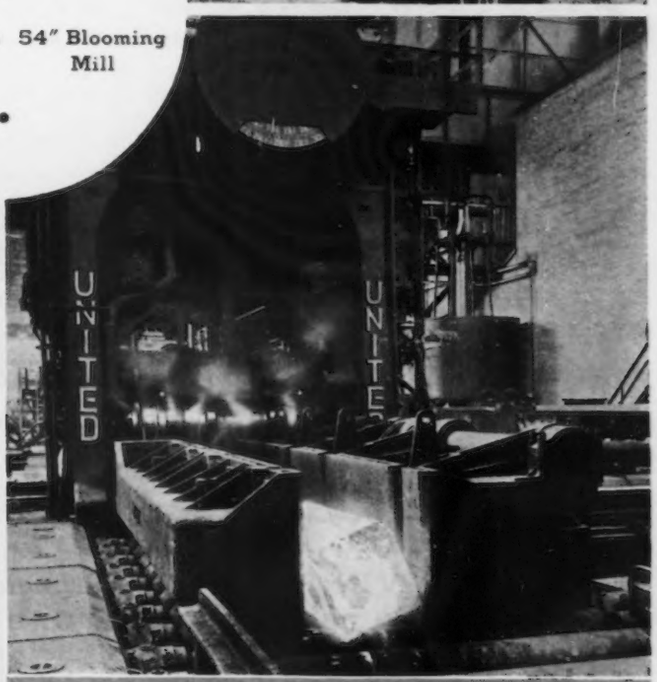

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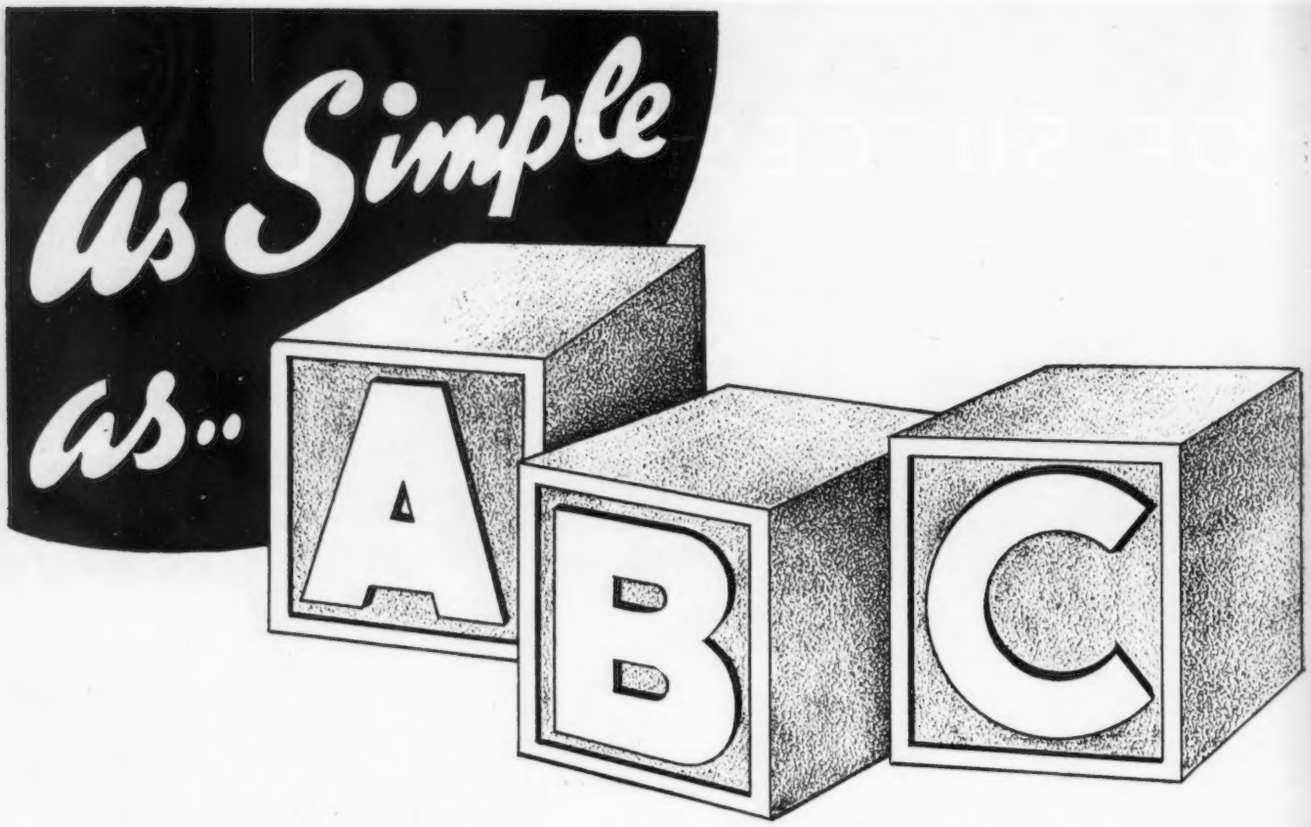

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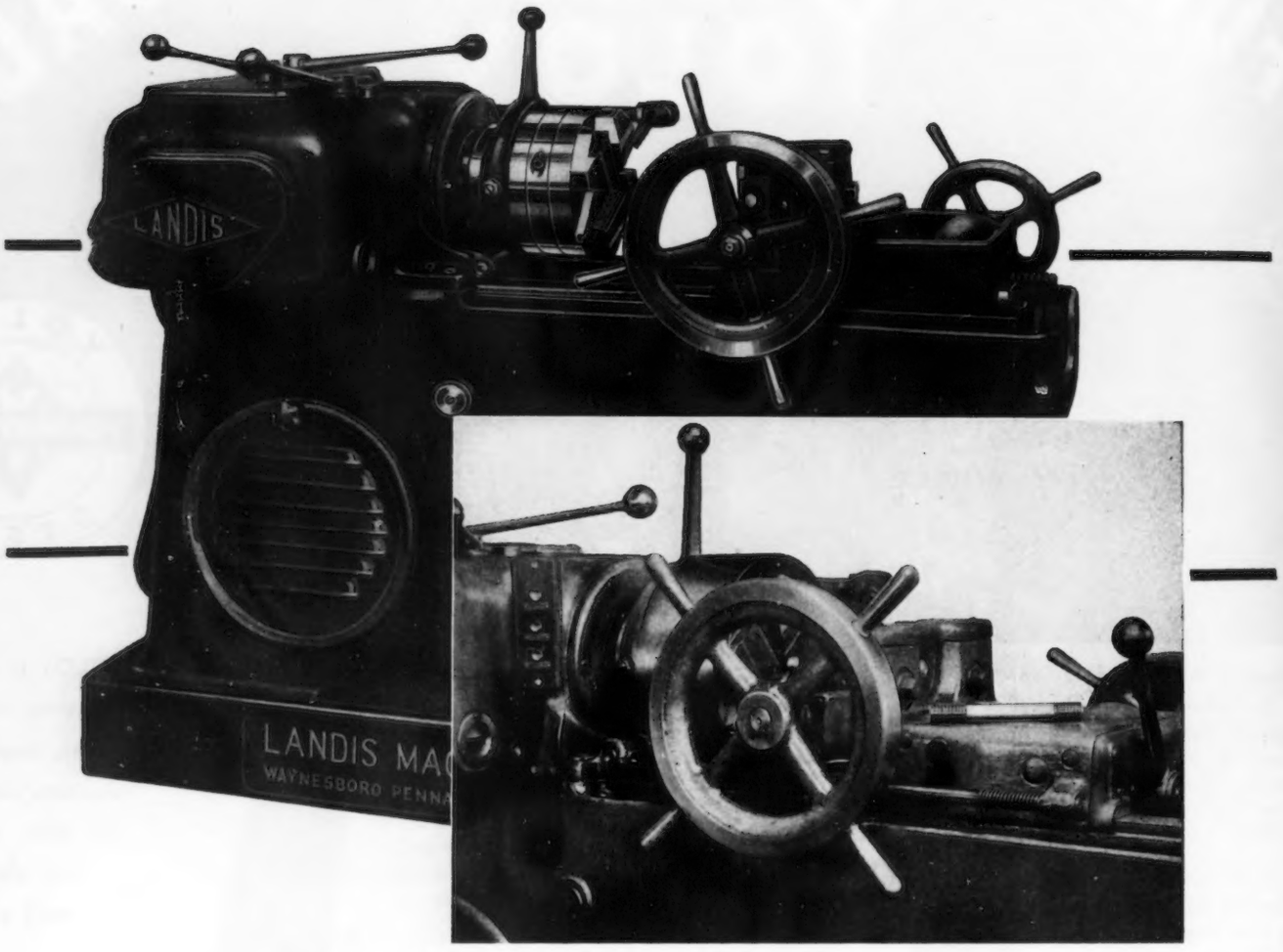

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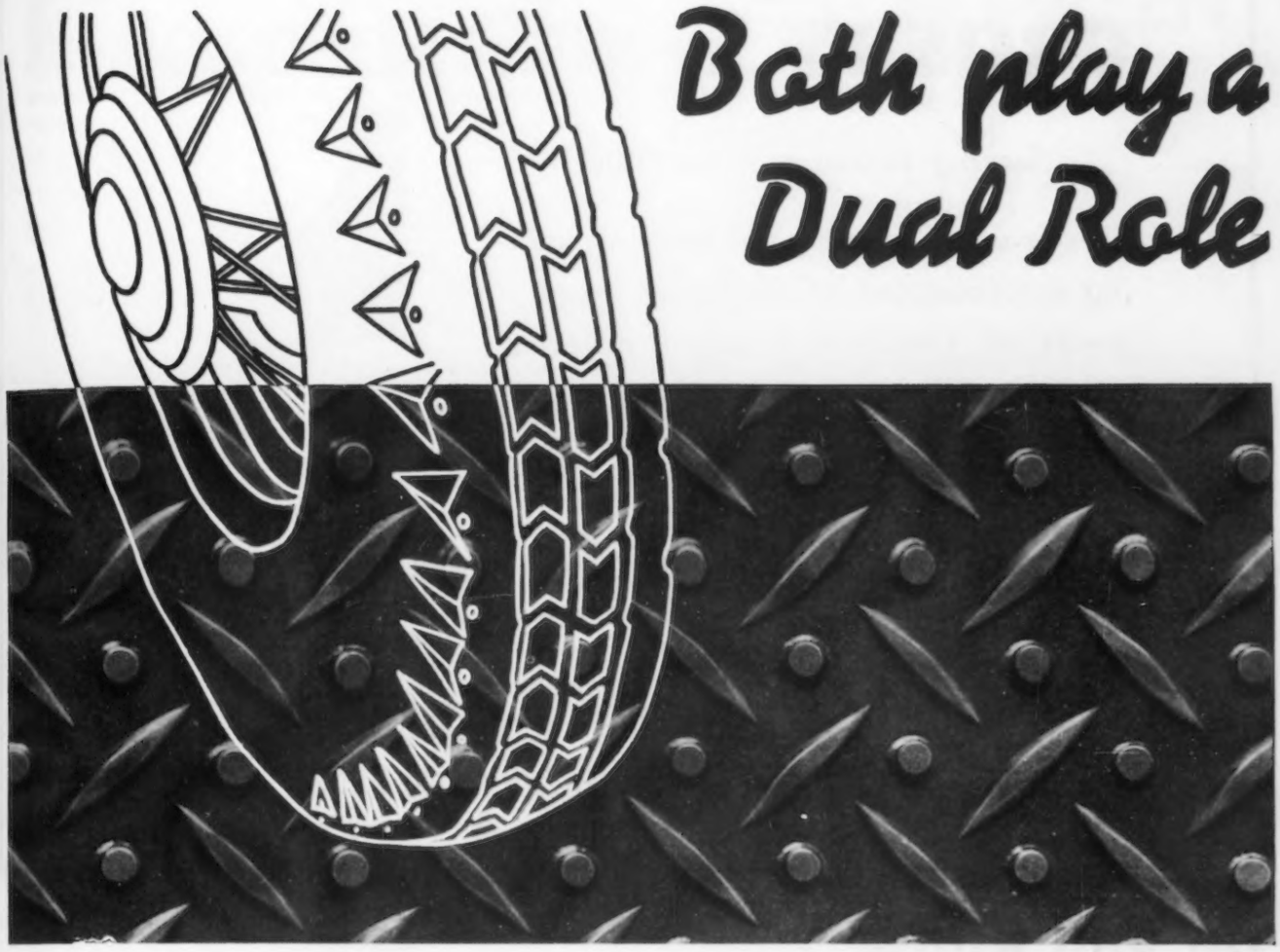

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Ames, W., & Co., Jersey City, N. J.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Co., The, Canton, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.
BATTERIES—Storage
Edison Storage Battery, Div. of Thomas A. Edison, Inc., West Orange, N. J.
Electric Storage Battery Co., The, Phila.
BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.
BEAMS—See Angles, Beams, Channels and Tees
BEARINGS—Ball
Bantam Ball Bearing Co., The, South Bend, Indiana.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
New Departure Mfg. Co., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.
BEARINGS, Brass and Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O.
BEARINGS—Oilless
Bunting Brass & Bronze Co., Toledo, O.
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.
Richardson Co., The, Melrose Park, Ill.
BEARINGS—Quill
Bantam Ball Bearing Co., The, South Bend, Indiana.
BEARINGS—Radial
Bantam Ball Bearing Co., The, South Bend, Indiana.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Roller Bearing Co., Newark, N. J.
New Departure Mfg. Co., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Shafer Bearing Corp., Chicago.
BEARINGS—Roll Neck
Bantam Ball Bearing Co., The, South Bend, Indiana.
Morgan Construction Co., Worcester, Mass.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., Chicago.
Timken Roller Bearing Co., The, Canton, O.
BEARINGS—Roller
Bantam Ball Bearing Co., The, South Bend, Indiana.
Hyatt Roller Bearing Co., Newark, N. J.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., Chicago.
Timken Roller Bearing Co., The, Canton, O.
BEARINGS—Roller Tapered
Bantam Ball Bearing Co., The, South Bend, Indiana.
Timken Roller Bearing Co., The, Canton, O.
BEARINGS—Rolling Mill Equipment
Bantam Ball Bearing Co., The, South Bend, Indiana.
Richardson Co., The, Melrose Park, Ill.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.
BEARINGS—Self-aligning Roller
Shafer Bearing Corp., Chicago.

JUST BETWEEN US TWO

Soul-Searching

WITH 1936 within a hair of being history, it behooves us to reflect on our victories and defeats during the year. Here they are starkly:

Victories:

a. 21 per cent gain in advertising volume.
b. 6 per cent gain in circulation volume.
c. Maintenance of high subscription renewal percentage (tops for the general metal-working papers).

Defeats:

Nil.

We are very sorry about our failure to find anything suitable for the defeat column. It isn't because we didn't try. We thought long and hard about it for a minute or so, and all we could recall was one criticism from an ex-subscriber in Chicago who says he will not come back until we have something on hunting and fishing. We could run that story Sam DeWolf sent in regarding the use of a weighted bag of corn-meal in catching bluefish. But life is real, life is earnest. We have no time for frivolity.

Therefore, if you get the idea that on the whole 1936 was one long, sweet song, you are right. Although '37 will be 27/100ths of 1 per cent shorter, we expect it to be even sweeter.

Onward and Upward

WE even devoted five minutes to considering how this column might be improved in 1937, but decided it is practically perfect as it is. This is not merely a personal opinion, but is confirmed by the steady increase in column readers. On Dec. 31, 1935, the total was 17. It is now 18. We distrust mushroom growth. Gray's plowman will continue to be our guide.

Better and Harder Problems

WE may make one slight change, and perhaps will eliminate all but difficult problems, as the Einsteins claim they have not been able to work up even a light sweat. But we would like to get this one in under the wire before the change. If you solve it instantly you get no credit, as that will simply reveal that you have a mind of childlike clarity and to you it is no problem at all. No credit either if you take more than 20 seconds. But if you solve it in 10 to 20 seconds, mark yourself down as one with a prodigious intellect.

> A man has two dozen socks of four different colors in a bureau drawer. What is the smallest number of socks he can take out of the drawer and assure himself of getting a matching pair of any of the four colors?

Cry for Help Answered

IF A. W. M., who dreams about a perfect jack-knife he saw when a boy, will communicate with us we will tell him where H. W. W. of Westinghouse Air Brake Co. and W. A. Schuyler tells us he can probably get the knife.

Thanks to these two gentlemen for preserving the infallibility of The Iron Age.

Eye to Eye

FREDERICK C. WERLE, Detroit, writes:

> "I was just looking through your Oct. 22 issue which I picked up in the shop (I am a toolmaker at Ex-Cell-O Corp.) and when reading your column was struck with the item "Eye Arresters" because the very instant I read it the four ads you referred to came to my mind and I remember reading each one of them in full. . . .
>
> "I just had to let you know about it because it impressed the fact on me that not all the claims of advertising as a science are unfounded, which I thought before."

Advertising is far from a science, but when a man writes an advertisement that makes an impression lasting more than two months he is indeed a master craftsman.

Nerve-Wracked, Hollow-Eyed

THE labor pains incident to the birth of such a great issue as that coming out next week are tremendous. Our editors are nerve-wracked from overwork and hollow-eyed from lack of sleep. The lights in the Advertising Department burn till midnight. The air of tension here is disturbing to one of our mañana temperament. It will be over in a day or two, and we are glad, for it is very exhausting watching others work so hard. You can look for the best issue The Iron Age has ever published.

To Iron Age readers here and in Australia, Austria, Belgium, British West Indies, Canada, Canal Zone, China, Czechoslovakia, Denmark, Dutch East Indies, England, France, Germany, Hawaii, Holland, Honduras, Hungary, India, Ireland, Italy, Japan, Jugo-Slavia, Lithuania, Luxembourg, Manchukuo, Mexico, Newfoundland, New Zealand, Norway, Philippines, Roumania, Scotland, South America, South Africa, Spain, Sweden, Switzerland, U.S.S.R., and Wales, a Happy and Prosperous New Year!

—A.H.D.

Cone 4-Spindle Automatics

Are economical and accurate producers of screw machine parts up to 6" diameter, 7" milling length. They cut costs, increase production, boost profits.

Write for particulars

CONE AUTOMATIC MACHINE CO., Inc.
WINDSOR, VERMONT

REPRESENTATIVES:

Detroit: J. C. Austerberry's Sons, 634 E. Congress St., Detroit, Mich.
Chicago: John H. Glover, 2127 North Sayre Ave., Chicago, Ill.
Ohio: S. B. Martin, 1077 Erie Cliff Drive, Lakewood, Ohio.
New England: Potter & Johnston Machine Co., Pawtucket, R. I.
Indiana: G. A. Richey, Chamber of Commerce Bldg., Indianapolis, Ind.
New York State: Syracuse Supply Co., Syracuse, N. Y.; also Rochester, N. Y.
Pennsylvania: Arch Machinery Co., 1005 Park Bldg., Pittsburgh, Pa.
Philadelphia: Lloyd & Arms, Inc., 133 South 36th St., Phila., Pa.
California: C. F. Bulotti Machinery Co., 829-831 Folsom St., San Francisco, Calif.

GOSS and DE LEEUW
MULTIPLE SPINDLE
CHUCKING MACHINES
Two, Four, Five Spindles • Work and Tool Rotating Types
GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

LUCAS "PRECISION"
Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.
NOW AND ALWAYS OF
CLEVELAND, OHIO, U.S.A.

ADVERTISING POWER
Iron Age readers are men who decide and buy.

LELAND-GIFFORD COMPANY
Worcester, Mass.
Drilling Machinery
Belt and Motor Spindle
One to Six Spindles
Tapping Attachments and Multiple Heads

MORE FOR LESS!
The Iron Age is the metal-working industry's No. 1 publication.

And yet The Iron Age's advertising rate is lower than that of some publications which offer less.

Products Index

BEARINGS—Shaft Hanger
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., Newark, N. J.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., Chicago.

BEARINGS—Thrust
Bantam Ball Bearing Co., The, South Bend, Indiana.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Roller Bearing Co., Newark, N. J.
New Departure Mfg. Co., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Shafer Bearing Corp., Chicago.
Timken Roller Bearing Co., The, Canton, O.

BELT DRESSING
Graton & Knight Co., Worcester, Mass.
Rhoads, J. E., & Sons, Philadelphia.

BELT FASTENERS
Bristol Co., The, Waterbury, Conn.
Graton & Knight Co., Worcester, Mass.

BELT LACER
Bristol Co., The, Waterbury, Conn.

BELT LACING
Graton & Knight Co., Worcester, Mass.
Rhoads, J. E., & Sons, Philadelphia.

BELT—Conveyor, Elevator
Goodrich, B. F., Co., The, Akron, Ohio.
Graton & Knight Co., Worcester, Mass.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

BELTING CEMENT
Graton & Knight Co., Worcester, Mass.
Rhoads, J. E., & Sons, Philadelphia.

BELTING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Graton & Knight Co., Worcester, Mass.
Houghton, E. F., & Co., Philadelphia.
Rhoads, J. E., & Sons, Philadelphia.

BELTING—Metal, Conveyor, High and Low Temperature
Acme Steel Co., Chicago, Ill.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

BELTING—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Graton & Knight Co., Worcester, Mass.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.

BELTS—V-Type
Allis-Chalmers Mfg. Co., Milwaukee.
Graton & Knight Co., Worcester, Mass.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

BENDING MACHINES—Hand, Band and Angle
Excelsior Tool & Mch. Co., E. St. Louis, Ill.

BENDING MACHINES—Hand and Power
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Niagara Machine & Tool Works, Buffalo, N. Y.

BENZOL RECOVERY PLANTS
Koppers Construction Co., The, Pittsburgh.

BERYLLIUM COPPER
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Riverside (N. J.) Metal Co.

BILLETS—Alloy Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon Vanadium Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Nickel Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Die Block Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Forging
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Central Iron & Steel Co., Harrisburg, Pa.
Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Cleveland, Ohio.

BILLETS—Nickel Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Re-rolling
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.

BILLETS—Steel
Bethlehem (Pa.) Steel Company.
Continental Steel Corp., Kokomo, Ind.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BLANKS—Chisel
Cleveland Steel Tool Co., The, 660 E. 82nd St., Cleveland, Ohio.

BLANKS—Gear and Pinion
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Richardson Co., The, Melrose Park, Ill.

BLAST FURNACES
Brassert, H. A., & Co., Chicago, Ill.

BLAST GATES
Rockwell, W. S., Co., 50 Church St., N. Y. C.

BLOCKS—Chain
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

BLOWERS
Clarage Fan Co., Kalamazoo, Mich.
Spencer Turbine Co., Hartford, Conn.

BLOWPIPES—Oxy-Acetylene Welding & Cutting
Linde Air Prods. Co., The, 30 E. 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit.

BLOWPIPES — Soldering, Heating, Annealing
American Gas Furnace Co., Elizabeth, N.J.
Weldit Acetylene Co., Detroit.

BOILERS—Waste Heat
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOILERS—Water Tube
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOLT CUTTERS
Landis Mch. Co., Inc., Waynesboro, Pa.

BOLT AND NUT MACHINERY
Landis Machine Co., Inc., Waynesboro, Pa.
Manville, E. J., Mch. Co., Waterbury, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.

BOLT & RIVET CLIPPERS
Bremil Mfg. Co., Erie, Pa.
Helwig Mfg. Co., St. Paul, Minn.

BOLTS—Carriage and Machine
Cleveland (Ohio) Cap Screw Co., The.
Erie (Pa.) Bolt & Nut Co.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Special
Erie (Pa.) Bolt & Nut Co.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Stove
Blake & Johnson Co., The, Waterville, Ct.

BOLTS—Track
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Republic Steel Corp., Upson Nut Div., Cleveland, O.

BOLTS AND NUTS
Ames, W., & Co., Jersey City, N. J.
Clark Bros. Bolt Co., Millidale, Conn.
Erie (Pa.) Bolt & Nut Co.
Heiz & Heiz, Inc., 33—34th St., Brooklyn, N. Y.
Oliver Iron & Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOND—Grinding Wheel
Bakelite Corp., 247 Park Ave., N. Y. C.

BORING—Hollow
American Hollow Boring Co., 1912 Raspberry St., Erie, Pa.

BORING BARS
Bullard Co., The, Bridgeport, Conn.

BORING, DRILLING & MILLING MACHINES—Horizontal
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
Lucas Machine Tool Co., Cleveland.
National Automatic Tool Co., Richmond, Ind.

BORING & DRILLING MACHINES—Vertical
Baker Bros., Inc., Toledo, Ohio.
Bullard Co., The, Bridgeport, Conn.

BORING MACHINES—Diamond
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit.

BORING MACHINES—Diamond & Carbide Tools
Herld Mch. Co., Worcester, Mass.

BORING MACHINES—Jig
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

BORING & TURNING MILLS—Vertical
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Planer Co.

BOX STRAPPING
Acme Steel Co., Chicago, Ill.

BOXES—Steel
Berger Mfg. Co., The, Canton, Ohio.

BRAKE LINING AND BLOCKS—Asbestos
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

BRAKES—Electric
Cutler-Hammer, Inc., Milwaukee.

BRAKES—Electric & Mechanical
Clark Controller Co., The, Cleveland.
Electric Controller & Mfg. Co., The, Cleveland.

BRAKES—Magnetic
Stearns Magnetic Mfg. Co., 626 So. 28th St., Milwaukee.

BRAKES—Metal Forming
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Steelweld Machinery Co., Cleveland.

BRICK—Fire Clay
Carborundum Co., The, Niagara Falls, N. Y.
Illinois Clay Products Co., Joliet, Ill.

BRICK—Insulating
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BRIDGE BUILDERS
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Belmont Iron Works, Philadelphia.

BRIDGE OPERATING MACHINERY—Movable
Earle Gear & Mch. Co., Philadelphia.

BROACHES
Colonial Broach Co., Detroit, Mich.

BROACHING MACHINES
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Milling Mch. Co., The.
Colonial Broach Co., Detroit, Mich.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

BRONZE FOR DIES
Ampco Metal, Inc., Milwaukee, Wis.

BRONZE—Phosphor
Bunting Brass & Bronze Co., Toledo, Ohio.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

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Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

BUCKETS—Clamshell
Erie (Pa.) Steel Construction Co.
Hayward Co., The, 50 Church St., N. Y. C.
Industrial Brownhoist Corp., Bay City, Mich.

BUCKETS—Electric Motor
Erie (Pa.) Steel Construction Co.
Hayward Co., The, 50 Church St., N. Y. C.

BUCKETS—Orange Peel
Erie (Pa.) Steel Construction Co.
Hayward Co., The, 50 Church St., N. Y. C.

BUFFERS & POLISHING MACHINES
Vonnegut Moulder Corp., 1807 Madison Ave., Indianapolis, Ind.

BUILDINGS—Steel
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Belmont Iron Works, Philadelphia.
Bethlehem (Pa.) Steel Co.

BULLDOZERS
Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Steelweld Machinery Co., Cleveland.

BULLDOZERS—Hydraulic
Elmes, Chas. F., Engng. Wks., Chicago.

BURNERS—Oil or Gas
Wilson, Lee Engineering Co., The, Cleveland.

BUSHINGS—Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O.
Phosphor Bronze Smelting Co., The, Phila.
Shenango-Penn Mold Co., Pittsburgh.

BUSHINGS—Oilless
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BUSHINGS—Phosphor Bronze
Bunting Brass & Bronze Co., Toledo, Ohio.
Phosphor Bronze Smelting Co., The, Phila.

BY-PRODUCTS COKE AND GAS OVENS
Koppers Construction Co., The, Pittsburgh.

CABLE—Electric
General Electric Co., Schenectady, N. Y.
Simplex Wire & Cable Co., Cambridge A, Boston, Mass.

CABLEWAYS AND TRAMWAYS — See Tramways

CADMIUM
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Udylite Co., The, Detroit.

CADMIUM PLATING PROCESS
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Udylite Co., The, Detroit.

CARBIC
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

CARBIDE
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

CARBIDE—Boron
Norton Co., Worcester, Mass.

CARBURIZING—See Heat Treating

CARS—Industrial and Mining
Atlas Car & Mfg. Co., The, Cleveland.
Bartlett, C. O., & Snow Co., The, Cleveland.

CASE HARDENING—See Heat Treating

CASTINGS—Acid or Heat Resisting
American Manganese Steel Co., Chicago Heights, Ill.
Ampco Metal, Inc., Milwaukee, Wis.
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
Hoskins Mfg. Co., Detroit, Mich.
Lebanon (Pa.) Steel Foundry.
Midvale Co., The, Nicetown, Phila., Pa.

CASTINGS—Alloy Steel
Bissett Steel Co., The, Cleveland.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.

CASTINGS—Brass, Bronze, Copper or Aluminum
Cadman, A. W., Mfg. Co., Pittsburgh.
Carbon Malleable Casting Co., Inc., Lancaster, Pa.
Phosphor Bronze Smelting Co., The, Phila.
Snyder, W. P., & Co., Pittsburgh.
Spencer's, I. S., Sons, Inc., Guilford, Ct.

CASTINGS—Corrosion Resisting
American Manganese Steel Co., Chicago Heights, Ill.
Midvale Co., The, Nicetown, Phila., Pa.

CASTINGS—Electric Steel
Industrial Steel Casting Co., The, Toledo.
Lebanon (Pa.) Steel Foundry.

CASTINGS—Gray Iron
Cheney, S., & Son, Manlius, N. Y.
Dubois (Pa.) Iron Works.
Midvale Co., The, Nicetown, Phila., Pa.
National Roll & Fdry. Co., Avonmore, Pa.
North Wales (Pa.)) Mach. Co., Inc.
Spencer's, I. S., Sons, Inc., Guilford, Ct.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

CASTINGS—Magnesium Alloys
Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.

CASTINGS—Malleable
Carbon Malleable Casting Co., Inc., Lancaster, Pa.
Lake City Malleable Co., The, 5100 Lakeside Ave., Cleveland.
Malleable Iron Fittings Co., Branford, Ct.
Peoria (Ill.) Malleable Castings Co.

CASTINGS—Manganese Steel
American Manganese Steel Co., Chicago Heights, Ill.

CASTINGS—Monel & Nickel
Superior Bronze Corp., Erie, Pa.

CASTINGS—Semi-Steel
Malleable Iron Fittings Co., Branford, Ct.

CASTINGS—Steel
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Crucible Steel Castings Co., Lansdowne, Pa.
Industrial Steel Castings Co., The, Toledo.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh.
Malleable Iron Fittings Co., Branford, Ct.
Mesta Mch. Co., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.

CEMENT—Acid Proof
Atlas Mineral Products Co. of Pa., The, Mertztown, Pa.

CEMENT—Quick Setting, Acid Proof & Insulator
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

CEMENT—Refractory
Carborundum Co., The, Perth Amboy, N. J.

CEMENT—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.

CHAINS—Conveyor & Elevator
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Bartlett, C. O., & Snow Co., The, Cleveland.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Power Transmission
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Boston Gear Works, Inc., North Quincy, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Roller
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Bartlett, C. O., & Snow Co., The, Cleveland.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Silent
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHANNELS—See Angles, Beams, Channels and Tees

CHECKS—Metal
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

CHEMICALS—Industrial
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.

CHEMICALS—Rust Proofing
Alrose Chemical Co., Providence, R. I.
Bonding Process Corp., 10401 Northlawn Ave., Detroit.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
Udylite Co., The, Detroit.

CHROMIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CHROMIUM PLATING — See Plating-Chromium

CHUCKING MACHINES—Multiple Spindle
Baird Mch. Co., The, Bridgeport, Conn.
Goss & DeLeeuw Machine Co., The, New Britain, Conn.
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CHUCKS—Air Operated
Hannifin Mfg. Co., Chicago.

CHUCKS—Drill
Cleveland (Ohio) Twist Drill Co., The.
Cushman Chuck Co., Hartford, Conn.
Morse Twist Drill & Mach. Co., New Bedford, Mass.

CHUCKS—Electric
Cushman Chuck Co., Hartford, Conn.

CHUCKS—Lathe
Cushman Chuck Co., Hartford, Conn.

CHUCKS—Magnetic
Heald Mch. Co., Worcester, Mass.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

CIRCLES—Phosphor Bronze
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Riverside (N. J.) Metal Co.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Detroit Rex Products Co., Detroit, Mich.
Ford, J. B., Co., The, Wyandotte, Mich.
Meaker Co., The, Chicago.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

CLEANING COMPOUNDS—Alkali
Detroit Rex Products Co., Detroit, Mich.

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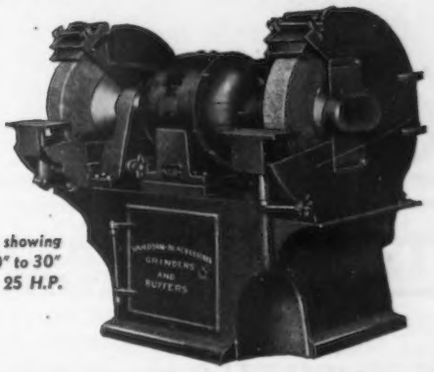

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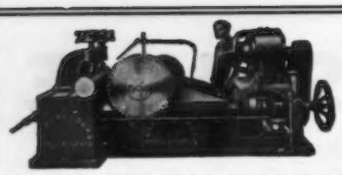

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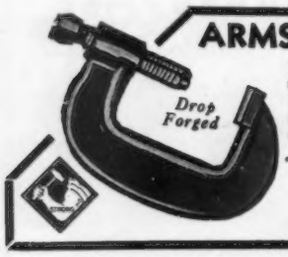

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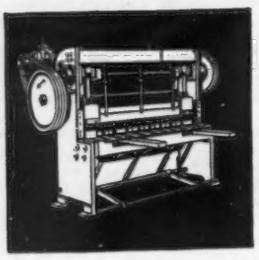

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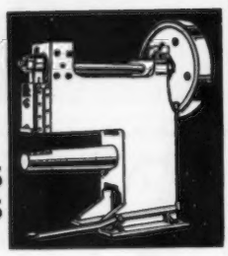

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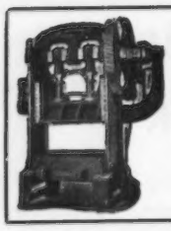

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Babcock & Wilcox Co., The, 85 Liberty St., New York City.

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FLOODLIGHTS—Acetylene
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Tide Water Oil Co., 17 Battery Place, N. Y. C.

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GRINDING MACHINES—Valve
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Sherwin-Williams Co., Cleveland.
LADDERS—Safety
Dayton Safety Ladder Co., Cincinnati.
LAMPS—Filament
General Electric Co., Cleveland.
LAMPS—Mercury Vapor
General Electric Vapor Lamp Co., Hoboken, N. J.
LATHES—Automatic
Baird Mch. Co., The, Bridgeport, Conn.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Goss & De Leeuw Mch. Co., The, New Britain, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Monarch Mch. Tool Co., The, Sidney, O.
LATHES—Automatic Vertical
Baird Mch. Co., The, Bridgeport, Conn.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
LATHES—Bench
Hardinge Bros., Inc., Elmira, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
South Bend (Ind.) Lathe Works, 595 E. Madison St.
LATHES—Brass
Warner & Swasey Co., The, Cleveland.
LATHES—Chucking
Jones & Lamson Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.
LATHES—Contour Turning
Monarch Mch. Tool Co., The, Sidney, O.
LATHES—Crankshaft
LeBlond, R. K., Mch. Tool Co., Cincinnati.
LATHES—Engine
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
South Bend (Ind.) Lathe Works, 595 E. Madison St.
LATHES—Roll
Lewis Foundry & Mch. Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.
LATHES — Second-Hand. (See Clearing House Section)
LATHES—Toolroom
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
South Bend (Ind.) Lathe Works, 595 East Madison St.
LATHES—Turret
Acme Machine Tool Co., Cincinnati.
Bardons & Oliver, Cleveland.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.
LATHES—Turret, Vertical
Bullard Co., The, Bridgeport, Conn.
LEAD—In Oil
Sherwin-Williams Co., Cleveland.
LEATHER—Cup
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
LEGGINS—Safety
Safety Equipment Service Co., The, Cleve.
LEVELING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
LOCK WASHER MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.
LOCOMOTIVES—Electric
Atlas Car & Mfg. Co., The, Cleveland.
General Electric Co., Schenectady, N. Y.
LOCOMOTIVES—Storage Battery
Atlas Car & Mfg. Co., The, Cleveland.
LUBRICANTS—Crusher & Grinding
Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.
LUBRICANTS—Gear
Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.
LUBRICANTS—High Pressure & Temperature
Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.
LUBRICANTS—Mine Cars
Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Pl., N. Y. C.
LUBRICANTS—Mining Machines
Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Pl., N. Y. C.
LUBRICANTS—Railroad
Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.

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Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place N. Y. C.

LUBRICANTS—Tipple & Cleaning
Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broad way, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.

MACHINE GUARD MATERIALS
Erdle Perforating Co., Rochester, N. Y.

MACHINE WORK
Dubois (Pa.) Iron Works.
General Machine Works, York, Pa.
Houde Engineering Corp., Buffalo, N. Y.
Taft-Peirce Mfg. Co., The, Woonsocket, R.I.

MACHINERY DEALERS — Second-Hand, (See Clearing House Section)

MACHINISTS' SMALL TOOLS
Starrett, L. S., Co., Athol, Mass.

MAGNESITE—Brick or Dead Burnt
Carborundum Co., The, Perth Amboy, N. J.

MAGNESIUM
Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.

MAGNETS—Lifting
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleve.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.

MALLETS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.
Metal & Thermit Corp., 120 B'way, N. Y. C.

MANHOLE FITTINGS AND SADDLES
Worth Steel Co., Claymont, Del.

MANIFOLDS—Oxygen & Acetylene
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

MARKING MACHINES
Noble & Westbrook Mfg. Co., The, East Hartford, Conn.

METAL PARTS—Rubber Covered
American Hard Rubber Co., 11 Mercer St., N. Y. C.

METAL SPECIALTIES
Berger Mfg. Co., The, Canton, Ohio.
Crosby Co., The, Buffalo, N. Y.
Cuyahoga Spring Co., The, Cleveland.
Toledo (Ohio) Stamping & Mfg. Co.
Torrington (Ct.) Co.
Truscon Steel Co., Pressed Steel Div., Cleveland.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.
Worcester (Mass.) Stamped Metal Co.

METALLOGRAPHIC EQUIPMENT
Bausch & Lomb Optical Co., Rochester, New York.

METALS COATING
Metals Coating Co. of America, Philadelphia, Pa.

METERS—Flow
Brown Instrument Co., Philadelphia.

MICROMETERS
Starrett, L. S., Co., Athol, Mass.

MICROMETERS—Automatic, for Rolling Mills
Haines Gauge Co., The, Phila., Pa.

MICRO-PHOTOGRAPHIC EQUIPMENT
Bausch & Lomb Optical Co., Rochester, New York.

MICROSCOPES—Toolmakers
Bausch & Lomb Optical Co., Rochester, New York.

MILLING MACHINES—Automatic
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.

MILLING MACHINES—Bench
Hardinge Bros., Inc., Elmira, N. Y.

MILLING MACHINES—Horizontal
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.

MILLING MACHINES—Planer Type
Cincinnati (Ohio) Planer Co.

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MILLING MACHINES—Vertical
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.

MONEL METAL
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

MONORAIL SYSTEMS—Hand & Electric
American Monorail Co., Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

MOTORS—Electric
Allis-Chalmers Mfg. Co., Milwaukee.
Fairbanks, Morse & Co., Chicago.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., Cleveland.
Reliance Electric & Engineering Co., Cleveland.
Westinghouse Elec. & Mfg. Co., E. Pgh.

MOTORS—Electric, Second-Hand. (See Clearing House Section)

NAILS—Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Hassall, John, Inc., Clay & Oakland Sts., Bklyn., N. Y.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
Youngstown (Ohio) Sheet & Tube Co., The.

NICKEL
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

NICKEL ANODES—Rolled or Cast
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

NICKEL SILVER
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

NITROGEN
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

NOZZLES—Sand Blasting
Norton Co., Worcester, Mass.

NUMBERING MACHINES—For Metal
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

NUTS—Acorn
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Castellated
National Acme Co., The, Cleveland.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Cold Punched
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Hot Pressed
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Machine Screw
Blake & Johnson Co., The, Waterville, Ct.

NUTS—Semi-Finished
Cleveland (Ohio) Cap Screw Co., The.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Thumb Malleable
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Wing
Parker-Kalon Corp., 196 Varick St., N. Y. C.

OIL & GREASE SEALS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

OIL—Fuel, Low Sulphur
Bennett Oil Co., Inc., 366 Madison Ave., New York City

OIL RETAINERS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

OIL STONES
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

OILS—Soluble—See Oils—Cutting

OILS—Cutting
Houghton, E. F., & Co., Philadelphia.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Tide Water Oil Co., 17 Battery Place, N. Y. C.

OILS—Fuel
Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Tide Water Oil Co., 17 Battery Place, N. Y. C.

OILS—Lubricating
Gulf Oil Corp. of Pa., Gulf Refining Co., Pittsburgh.
Houghton, E. F., & Co., Philadelphia.
Penola, Inc., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.

ORES—Iron
Cleveland-Cliffs Iron Co., Cleveland, Ohio.
Hanna Furnace Corp., The, Detroit, Mich.
Pickands Mather & Co., Cleveland.
Shenango Furnace Co., Pittsburgh.
Snyder, W. P., & Co., Pittsburgh.

OVENS—Coke and By-Product Recovery
Koppers Construction Co., The, Pittsburgh.

OVENS—Core and Mold
Holcroft & Co., Detroit.
Maehler, Paul Co., The, Chicago.

OVENS—Cross Regenerative
Koppers Construction Co., The, Pittsburgh.

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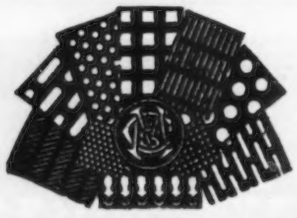

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Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

OXYGEN
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

PACKING—Felt
American Felt Co., 315 Fourth Ave., N. Y. C.

PACKING—Hydraulic
Rhoads, J. E., & Sons, Philadelphia.

PACKING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Graton & Knight Co., Worcester, Mass.
Rhoads, J. E., & Sons, Philadelphia.

PACKING—Metallic
Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

PACKING—Sheet, Asbestos or Rubber
Garlock Packing Co., The, Palmyra, N. Y.

PAINT
Larkin Co., Inc., Buffalo, N. Y.
Sherwin-Williams Co., Cleveland.

PERFORATED METAL
Chicago Perforating Co., 2440 W. 24th Place, Chicago, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chi.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

PHOSPHOR—Copper
Phosphor Bronze Smelting Co., The, Phila.

PICKLING COMPOUNDS
American Chemical Paint Co., Ambler, Pa.

PICKLING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Meaker Co., The, Chicago.
Mesta Mch. Co., Pittsburgh.

PICKLING TANK LININGS
Cellcote Co., The, Cleveland.

PICKLING TANK STEAM JETS
Durion Co., Inc., The., 438 N. Findlay St., Dayton, Ohio.

PIG IRON
Bethlehem (Pa.) Steel Co.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Cleveland-Cliffs Iron Co., Cleveland, Ohio.
Hanna Furnace Corp., The, Detroit, Mich
Pickands Mather & Co., Cleveland.
Republic Steel Corp., Cleveland, Ohio.
Shenango Furnace Co., Pittsburgh.
Shenango-Penn Mold Co., Pittsburgh.
Superior Charcoal Iron Co., Grand Rapids, Mich.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

PIG IRON—Charcoal
Superior Charcoal Iron Co., Grand Rapids, Mich.

PILING—Steel Pipe
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

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PINIONS—Rolling Mill
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PINIONS—Wire and Rod
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PIPE—Cast Iron, B. & S. and Flanged
Wood, R. D., & Co., Philadelphia.

PIPE—Hammer Welded
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PIPE—New and Second-Hand
Albert & Davidson Pipe Corp., 2nd Ave., 50-51st St., Bklyn., N. Y.
Albert Pipe Supply Co., Inc., Berry and N. 13th St., Bklyn., N. Y.
Fisher Bros. Steel Corp., Morris Ave. & 139th St., Bronx.
Greenpoint Iron & Pipe Co., Inc., 187-197 Maspeth Ave., Bklyn., N. Y.

PIPE—Seamless Brass or Copper
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

PIPE—Spiral Welded
American Rolling Mill Co., Middletown, O.
Crane Co., Chicago.

PIPE—Standard, Black and Galvanized
Bethlehem (Pa.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subidiary), Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Youngtown (Ohio) Sheet & Tube Co., The.

PIPE, Steel—Rubber Lined
American Hard Rubber Co., 11 Mercer St., N. Y. C.

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Republic Steel Corp., Cleveland, Ohio.

PIPE FITTINGS
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Jarecki Mfg. Co., Erie, Pa.

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Curtis & Curtis Co., Bridgeport, Conn.
Jarecki Mfg. Co., Erie, Pa.
Landis, Mach. Co., Inc., Waynesboro, Pa.
Merrell Mfg. Co., Toledo.
Murchey Machine & Tool Co., Detroit.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

PIPE — TUBE BENDING
Pittsburgh (Pa.) Piping & Equip. Co.

PLANERS
Cincinnati (Ohio) Planer Co.

PLANING MACHINES — Second-Hand. (See Clearing House Section)

PLASTICS—Laminated
Bakelite Corp., 247 Park Ave., N. Y. C.
General Plastics, Inc., 400 Walck Rd., No. Tonawanda, N. Y.

PLASTICS — Laminated or Molded Phenolic
Richardson Co., The, Melrose Park, Ill.

PLASTICS—Molded
Bakelite Corp., 247 Park Ave., N. Y. C.
General Plastics, Inc., 400 Walck Rd., No. Tonawanda, N. Y.

PLASTICS—Synthetic
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General Plastics, Inc., 400 Walck Rd., No. Tonawanda, N. Y.

PLATER'S CLEANING COMPOUND
American Chemical Paint Co., Ambler, Pa.

PLATES—Floor or Cellar Door
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Central Iron & Steel Co., Harrisburg, Pa.
Inland Steel Co., Chicago.

PLATES—Iron or Steel
Alan Wood Steel Co., Conshohocken, Pa.
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Granite City (Ill.) Steel Co.
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Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Joseph T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.
Youngstown (Ohio) Sheet & Tube Co., The.

PLATING—Chromium
United Chromium, Incorporated, 51 E. 42nd St., New York City.

PLUGS—Core Hole
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.

POLISHING MACHINES—Bar
Medart Co., The, St. Louis, Mo.

POWER UNITS—Rotary
Cushman Chuck Co., Hartford, Conn.
New Departure Mfg. Co., Bristol, Conn.

POWER UNITS—Straight Line
Cushman Chuck Co., Hartford, Conn.

PRESS BEDS—Pneumatic
Marquette Tool & Mfg. Co., Toledo, Ohio.

PRESS FEEDS—Automatic
Littell, F. J., Mch. Co., Chicago.

PRESSED METAL PARTS
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
Crosby Co., The, Buffalo, N. Y.
Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Transue & William Steel Forging Corp., Alliance, Ohio.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.

PRESSED STEEL PARTS
Berger Mfg. Co., The, Canton, Ohio.
Crosby Co., The, Buffalo, N. Y.
Lansing (Mich.) Stamping Co., So. Penn Ave.
Parish Pressed Steel Co., Reading, Pa.
Toledo (Ohio) Stamping & Mfg. Co.
Transue & William Steel Forging Corp., Alliance, Ohio.
Truscon Steel Co., Pressed Steel Div., Cleveland.

PRESSES—Automatic
Bliss, E. W., Co., Toledo, Ohio.
Henry & Wright Mfg. Co., The, Hartford, Conn.
Niagara Mch. & Tool Wks., Buffalo, N. Y.
V & O Press Co., Hudson, N. Y.

PRESSES—Baling
Galland-Henning Mfg. Co., Milwaukee.

PRESSES—Baling, Hydraulic
Galland-Henning Mfg. Co., Milwaukee.

PRESSES—Coining
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Zeh & Hahnemann Co., Newark, N. J.

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Elmes, Chas. F., Engng. Wks., Chicago.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hannifin Mfg. Co., Chicago.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.
Oilgear Co., The, 1311 W. Bruce, Milwaukee.
Wood, R. D., & Co., Philadelphia.

PRESSES—Multiple Plunger
Waterbury (Ct.) Farrel Fdry. & Mch. Co.

PRESSES—Power
Baird Mch. Co., The, Bridgeport, Conn.
Bliss, E. W., Co., Toledo, Ohio.
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago, Ill.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hyman, Joseph, & Sons, Phila.
Manville, E. J., Mch. Co., Waterbury, Ct.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Machine & Tool Wks., Buffalo, N. Y.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
V & O Press Co., Hudson, N. Y.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Trimming
Bliss, E. W., Co., Toledo, Ohio.
Chambersburg (Pa.) Engineering Co.
Erie (Pa.) Foundry Co.
Niagara Mch. & Tool Wks., Buffalo, N. Y.

PROJECTORS—Contour Measuring
Bausch & Lomb Optical Co., Rochester, New York.

PULLEYS—Iron, Solid & Split
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.

PULLEYS—Magnetic
Cutler-Hammer, Inc., Milwaukee.

PUMPS—Acid Resisting
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

PUMPS—Boiler Feed
Aldrich Pump Co., The, Allentown, Pa.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.

PUMPS—Centrifugal
Aldrich Pump Co., The, Allentown, Pa.
Fairbanks, Morse & Co., Chicago.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Rumsey Pump Corp., Seneca Falls, N. Y.
Ruthman Machinery Co., Cincinnati.
Tomkins-Johnson Co., The, Jackson, Mich.

PUMPS—Coolant
Ruthman Machinery Co., Cincinnati.

PUMPS—Electric
Fairbanks, Morse & Co., Chicago.

PUMPS—Hydraulic
Aldrich Pump Co., The, Allentown, Pa.
Elmes, Chas F., Engng. Wks., Chicago.
Fairbanks, Morse & Co., Chicago.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Rumsey Pump Corp., Seneca Falls, N. Y.
Vickers, Inc., 1420 Oakman Blvd., Detroit, Mich.

PUMPS—Power
Fairbanks, Morse & Co., Chicago.

PUMPS—Rotary
Vickers, Inc., 1420 Oakman Blvd., Detroit, Mich.

PUMPS—Rotary Positive, Centrifugal & Turbine
Crane Co., Chicago.

PUMPS—Steam
Fairbanks, Morse & Co., Chicago.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.

PUMPS—Vacuum
Chicago Pneumatic Tool Co., 6 East 44th St., N. Y. C.
Pennsylvania Pump & Compressor Co., Easton, Pa.

PUNCHES & DIES
Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

PUNCHING AND SHEARING MACHINES
Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co., The.
Excelsior Tool & Mach. Co., E. St. Louis, Ill.
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Niagara Machine & Tool Works, Buffalo, N. Y.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Thomas Shearing Mach. Co., Pittsburgh.

PYROMETERS—Indicating
Bristol Co., The, Waterbury, Conn.
Brown Instrument Co., Philadelphia.
Hoskins Mfg. Co., Detroit, Mich.

RAIL SPLICE BARS
Ames, W., & Co., Jersey City, N. J.

RAILS
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Foster, L. B., Co., Inc., Pittsburgh.
Frank, M. K., 480 Lexington Ave., N. Y. C.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

RAILS—Relaying
Hyman-Michaels Co., Chicago.
Sherwood, E. C., 7 Dey St., N. Y. C.

RAILWAY EQUIPMENT & SUPPLIES
Fairbanks, Morse & Co., Chicago.

REAMERS
Cleveland (Ohio) Twist Drill Co., The.
Gammons-Holman Co., Manchester, Conn.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

REAMERS—Expansion
Gammons-Holman Co., Manchester, Conn.

REAMERS—Helical Taper Pin
Gammons-Holman Co., Manchester, Conn.

REAMING MACHINES
Blanchard Machine Co., The, Cambridge, Mass.

REELS—For Coil Stock
Littell, F. J., Mch. Co., Chicago.

REFRACTORIES
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Cleveland (Ohio) Quarries Co., The.
Great Lakes Foundry Sand Co., Detroit.
Illinois Clay Products Co., Joliet, Ill.

REGULATORS—Compressed Gas
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

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Pittsburgh (Pa.) Steel Co.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

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Midvale Co., The, Nicetown, Phila., Pa.

RINGS—Welded
American Welding & Mfg. Co., Warren, O.

RIVET MAKING MACHINERY
Manville, E. J., Mch. Co., Waterbury, Ct.

RIVET SETS
Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

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Shuster, F. B., Co., The, New Haven, Ct.

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Blake & Johnson Co., The, Waterville, Ct.
Clark Bros. Bolt Co., Milldale, Conn.
Hassall, John, Inc., Clay & Oakland Sts., Bklyn, N. Y.
Oliver Iron & Steel Corp., Pittsburgh.
Progressive Mfg. Co., Torrington, Conn.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

RODS—Brass
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

RODS—Magnesium Alloys
Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.

RODS—Nickel Silver
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Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

RODS—Phosphor Bronze
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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

RODS—Welding
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American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., The, Cleveland.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
Metal & Thermit Corp., 120 B'way, N. Y. C.
Pittsburgh (Pa.) Steel Co.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Una Welding, Inc., Cleveland, Ohio.

RODS—Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Bethlehem (Pa.) Steel Co.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
Youngstown (Ohio) Sheet & Tube Co., The.

ROLLING MACHINERY—Cold Rolling
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Lewis Foundry & Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.

ROLLING MACHINERY—Sheet Metal
Lewis Foundry & Mch. Co., Pittsburgh.

ROLLING MILL MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Bliss, E. W., Co., Toledo, Ohio.
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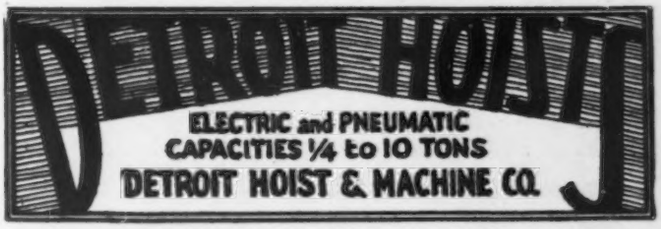

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Schatz Mfg. Co., The, Poughkeepsie, N. Y.

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Mesta Mch. Co., Pittsburgh.
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Pittsburgh (Pa.) Rolls Corp.
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ROOFING AND SIDING—Iron and Steel
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Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.

RUBBER MOLDED PARTS
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Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Richardson Co., The, Melrose Park, Ill.

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American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Bonding Process Corp., 10401 Northlawn Ave., Detroit.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING COMPOUNDS
Bonding Process Corp., 10401 Northlawn Ave., Detroit.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING PROCESS
American Chemical Paint Co., Ambler, Pa.
Bonding Process Corp., 10401 Northlawn Ave., Detroit.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
Udylite Co., The, Detroit.

RUST REMOVING
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

SAND BLAST EQUIPMENT AND MACHINES
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Pangborn Corporation, Hagerstown, Md.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

SAND—Foundry
Great Lakes Foundry Sand Co., Detroit.

SAND BLAST STEEL SHOT
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Great Lakes Foundry Sand Co., Detroit.
Pittsburgh (Pa.) Crushed Steel Co.

SAND HANDLING EQUIPMENT
Bartlett, C. O., & Snow Co., The, Cleveland.

SAND RAMMERS
Chicago Pneumatic Tool Co., 6 East 44th St., N. Y. C.

SAWING MACHINES—Metal
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SAWS—Band and Hack for Metal
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C., & Co., Indianapolis.
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Atkins, E. C., & Co., Indianapolis.

SAWS—Friction
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

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Atkins, E. C., & Co., Indianapolis.
Starrett, L. S., Co., Athol, Mass.

SAWS—Hot Metal
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Inserted Tooth, Cold
Disston, Henry, & Sons, Inc., Philadelphia.
Tabor Mfg. Co., Philadelphia.

SAWS—Milling
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SCALES
Fairbanks, Morse & Co., Chicago.

SCREENS—Perforated Metal
Chicago Perforating Co., 2440 W. 24th Place, Chicago, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chi.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

SCREENS—Woven Wire
Michigan Wire Cloth Co., 2117 Howard St., Detroit.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

SCREW MACHINE PRODUCTS
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Blake & Johnson Co., The, Waterville, Ct.
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Eastern Mch. Screw Corp., New Haven.
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Ottemiller, Wm. H., Co., Inc., York, Pa.
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National Acme Co., The, Cleveland.

SCREW MACHINERY—Hand
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Warner & Swasey Co., The, Cleveland.

SCREW MACHINERY—Multiple Spindle
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Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.

SCREW PLATES
Greenfield (Mass.) Tap & Die Corp.

SCREW STOCK
Union Drawn Steel Co., Massillon, Ohio.

SCREWS—Cap
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Ottemiller Wm. H., Co., Inc., York, Pa.

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Cleveland (Ohio) Cap Screw Co., The.
National Acme Co., The, Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.

SCREWS, Socket, Head, Cap
Bristol Co., The, Waterbury, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Thumb
Parker-Kalon Corp., 196 Varick St., N. Y.

SCRUBBING MACHINES—Sheet
Wean Engineering Co., Inc., The, Warren, Ohio.

SCYTHE STONES AND WHETSTONES
Carborundum Co., The, Niagara Falls, N. Y.

SECOND-HAND MACHINERY—(See Clearing House Section)

SEPARATORS—Magnetic
Dings Magnetic Separator Co., Milwaukee.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.

SHAFTING—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

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Bliss & Laughlin, Inc., Harvey, Ill.
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Bliss & Laughlin, Inc., Harvey, Ill.
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Wyckoff Drawn Steel Co., Pittsburgh, Pa.

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Eastern Tool & Mfg. Co., Bloomfield, N. J.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
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American Shear Knife Co., Homestead, Pa.
Heppenstall Co., Pittsburgh.

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Canton Fdry. & Mch. Co., Cleveland.

SHEARING MACHINES—Angle, Hand and Power
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Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Superior Sheet Steel Co., Canton, Ohio.
SHEETS—For Drawing and Stamping
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Empire Sheet & Tin Plate Co., Mansfield, Ohio.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Worth Steel Co., Claymont, Del.
SHEETS—Full Finished
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Empire Sheet & Tin Plate Co., Mansfield, Ohio.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.
SHEETS—Galvanized, Flat and Corrugated
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos., T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.
SHEETS—Long Terne
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The.
Superior Sheet Steel Co., Canton, Ohio.
Weirton (W. Va.) Steel Co.
SHEETS—Magnesium Alloys
Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.
SHEETS—Metal Furniture
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.
SHEETS—Pickled
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Empire Sheet & Tin Plate Co., Mansfield, Ohio.
Newport (Ky.) Rolling Mill Co., The.
Superior Sheet Steel Co., Canton, Ohio.
SHEETS—Tin Mill Black
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Empire Sheet & Tin Plate Co., Mansfield, Ohio.
Newport (Ky.) Rolling Mill Co., The.
SHELVING—Steel
Berger Mfg. Co., The, Canton, Ohio.
SHOWER BATH EQUIPMENT
Bradley Washfountain Co., Milwaukee.
SILICA SANDS
Great Lakes Foundry Sand Co., Detroit.
SILICO MANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
SILICON METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
SLABS
Andrews Steel Co., The, Newport, Ky.
SLINGS—Wire Rope
Roebling's, John A., Sons Co., Trenton, N. J.
SOLVENTS—Oil & Grease
Detroit Rex Products Co., Detroit, Mich.
SPACING TABLES—Punching & Shearing
Thomas Spacing Mach. Co., Pittsburgh.
SPECIAL MACHINERY
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Bullard Co., The, Bridgeport, Conn.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Houde Engineering Corp., Buffalo, N. Y.
Manville, E. J., Mch. Co., Waterbury, Ct.
Morgan Engineering Co., The, Alliance, O.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
Wood, R. D., & Co., Philadelphia.
SPECIALTIES—Rubber Covered & Lined
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Goodrich, B. F., Co., The, Akron, Ohio.

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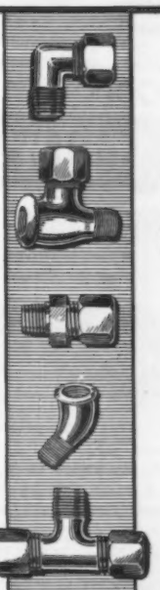

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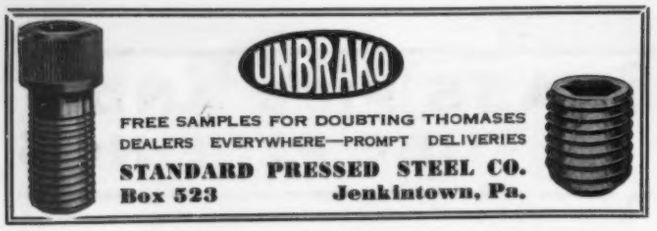

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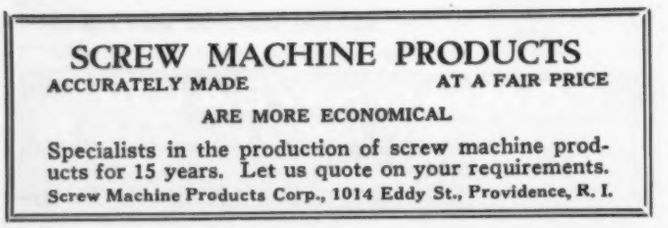
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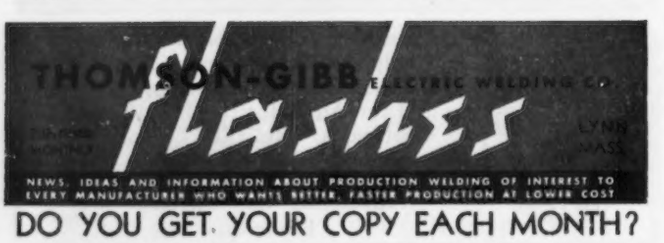
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Foote Gear Wks., Inc., 1315 S. Cicero Ave., Cicero, Ill.
Horsburgh & Scott Co., 5112 Hamilton Ave., Cleveland.
James, D. O., Mfg. Co., Chicago.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Philadelphia (Pa.) Gear Works.

SPIEGELEISEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SPIKES—Track
Ames, W., & Co., Jersey City, N. J.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

SPINDLES—Grinding
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit.

SPINDLES—Hollow Bored
American Hollow Boring Co., 1912 Raspberry St., Erie, Pa.

SPLICE BARS
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SPRAYERS—Metal
Metals Coating Co. of America, Philadelphia, Pa.

SPRING MAKING MACHINERY
Baird Mch. Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS—Car
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Muehlhausen Spring Co., Logansport, Ind.

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Amer. Spring & Mfg. Corp., Holly, Mich.
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Barnes-Gibson-Raymond, Inc., Detroit.
Barnes, Wallace, Co., The, Bristol, Conn.
Cook Spring Co., Div. of Barnes-Gibson-Raymond, Inc., Ann Arbor, Mich.
Cuyahoga Spring Co., The, Cleveland.
Dunbar Bros. Co., Bristol, Conn.
Gibson, Wm. D., Co., Chicago.
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Muehlhausen Spring Co., Logansport, Ind.
Raymond Mfg. Co., Corry, Pa.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

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Boston Gear Wks., Inc., North Quincy, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

STAMPINGS OR DRAWINGS—Metal
Barnes-Gibson-Raymond, Inc., Detroit.
Barnes, Wallace, Co., The, Bristol, Conn.
Berger Mfg. Co., The, Canton, Ohio.
Central Iron & Steel Co., Harrisburg, Pa.
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
Cook Spring Co. Div. of Barnes-Gibson-Raymond, Inc., Ann Arbor, Mich.
Crosby Co., The, Buffalo, N. Y.
Dunbar Bros., Co., Bristol, Conn.
Eastern Tool & Stpg. Co., Inc., Saugus, Mass
Gibson, Wm. D., Co., Chicago.
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Michigan.
Lansing (Mich.) Stamping So., So. Penn. Ave.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Parish Pressed Steel Co., Reading, Pa.
Raymond Mfg. Co., Corry, Pa.
Sheet Metal Specialty Co., Pittsburgh, Pa.
Toledo (Ohio) Stamping & Mfg. Co.
Torrington (Ct.) Co.
Transue & William Steel Forging Corp., Alliance, Ohio.
Truscon Steel Co., Pressed Steel Div., Cleveland.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.
Worcester (Mass.) Stamped Metal Co.

STAMPS—Steel Alphabets and Figures
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

STAPLES—Wire
Continental Steel Corp., Kokomo, Ind.
Wickwire Brothers, Cortland, N. Y.

STEEL—Acid Resisting
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

STEEL—Alloy
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Bissett Steel Co., The, Cleveland.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
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Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Co., The, Canton, Ohio.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Alloy, Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL—Bright Finished
Union Drawn Steel Co., Massillon, Ohio.

STEEL—Carbon
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Harrisburg (Pa.) Steel Corp.
Ingersoll Steel & Disc Co., Chicago.
Latrobe (Pa.) Electric Steel Co.

STEEL—Carbon Vanadium
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome
Andrews Steel Co., The, Newport, Ky.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Manganese
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Nickel
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Nickel Silver
Ingersoll Steel & Disc Co., Chicago.

STEEL—Chrome Vanadium
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Latrobe (Pa.) Electric Steel Co.

STEEL—Cobalt
Darwin & Milner, Inc., Cleveland.

STEEL—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Pittsburgh.
Latrobe (Pa.) Electric Steel Co.
Rathbone, A. B. & J., Palmer, Mass.
Ryerson, Joseph T., & Son, Inc., Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL—Cold Rolled Strips
Acme Steel Co., Chicago.
Allegheny Steel Co., West Leechburg Div., Brackenridge, Pa.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Athenia Steel Co., 135 William St., N. Y.
Bethlehem (Pa.) Steel Co.
Griffin Mfg. Co., Erie, Pa.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Steel & Tubes, Inc., Cleveland.
Superior Steel Corp., Grant Bldg., Pgh.
Thomas Steel Co., The, Warren, Ohio.
Weirton (W. Va.) Steel Co.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Cold Rolled Strips, Electric Copper Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Electro-Galvanized
Acme Steel Co., Chicago, Ill.
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Electro Tin Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Stainless
Acme Steel Co., Chicago.
Griffin Mfg. Co., Erie, Pa.

STEEL—Corrosion Resisting
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Midvale Co., The, Nicetown, Phila., Pa.

STEEL—Crucible
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Cutlery
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Die
Andrews Steel Co., The, Newport, Ky.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Disston, Henry, & Sons, Inc., Philadelphia.
Finkl, A., & Sons Co., Chicago.
Jessop, Wm., & Sons, Inc., 121 Varick St., N. Y. C.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.

STEEL—Drill
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.

STEEL—Electric
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Disston, Henry, & Sons, Inc., Philadelphia.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
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Timken Steel & Tube Co., The, Canton, O.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

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Ingersoll Steel & Disc Co., Chicago.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Hot Rolled Strips
Acme Steel Co., Chicago.
Allegheny Steel Co., West Leechburg Div., Brackenridge, Pa.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Laclede Steel Co., St. Louis, Mo.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Steel & Tubes, Inc., Cleveland.
Superior Steel Corp., Grant Bldg., Ptgh.
Weirton (W. Va.) Steel Co.

STEEL—Hot Rolled Strips, Electro Zinc Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Hot Rolled Strips, Galvanized
Acme Steel Co., Chicago.

STEEL—Magnet
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Latrobe (Pa.) Electric Steel Co.

STEEL—Nickel
Andrews Steel Co., The, Newport, Ky.

STEEL—Open Hearth
Andrews Steel Co., The, Newport, Ky.
Pittsburgh (Pa.) Steel Co.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Co., The, Canton, O.

STEEL—Rustless
Acme Steel Co., Chicago.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Griffin Mfg. Co., Erie, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Screw
Bliss & Laughlin, Inc., Harvey, Ill.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Co., The, Canton, O.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL—Special Analysis
Allegheny Steel Co., West Leechburg Div., Brackenridge, Pa.
Andrews Steel Co., The, Newport, Ky.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Harrisburg (Pa.) Steel Corp.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Co., The, Canton, O.

STEEL—Spring
Athenia Steel Co., 135 William St., N. Y.
Barnes-Gibson-Raymond, Inc., Detroit.
Barnes, Wallace, Co., The, Bristol, Conn.
Gibson, Wm. D., Co., Chicago.
Great Lakes Steel Corp., Detroit.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Co., The, Canton, O.

STEEL—Stainless
Acme Steel Co., Chicago.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Disston, Henry, & Sons, Inc., Philadelphia.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Stainless Clad
Ingersoll Steel & Disc Co., Chicago.

STEEL—Tool
Bethlehem (Pa.) Steel Company.
Bissett Steel Co., The, Cleveland.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Darwin & Milner, Inc., Cleveland.
Disston, Henry, & Sons, Inc., Philadelphia.
Ingersoll Steel & Disc Co., Chicago.
Jessop, Wm., & Sons, Inc., 121 Varick St., N. Y. C.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Midvale Co., The, Nicetown, Phila., Pa.
Milne, A., & Co., 745 Washington St., N. Y. C.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge Mass.

STEEL—Tool, Special Shapes
Latrobe (Pa.) Electric Steel Co.

STEEL—Vanadium
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL PLANTS AND ROLLING MILLS
Brassert, H. A., & Co., Chicago, Ill.

STEEL ROLLS
United Engineering & Fdry. Co., Ptgh.

STOKERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

STOP WATCHES
Stillman, M. J., Co., Inc., Chicago.

STOPS—Crane Limit
Electric Controller & Mfg. Co., The, Cleveland.

STRAIGHTENING MACHINES—Bar & Tube
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Medart Co., The, St. Louis, Mo.

STRUCTURAL IRON AND STEEL WORK
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Bethlehem (Pa.) Steel Co.
Morgan Engineering Co., The, Alliance, O.

STRUCTURAL STEEL — See Angles, Beams, Channels and Tees

STUDS
Erie (Pa.) Bolt & Nut Co.

SUPERHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

SWAGING MACHINES
Torrington (Ct.) Co.

SWITCHES—Electric
Westinghouse Elec. & Mfg. Co., East Ptgh.

TANK LININGS
Ceilcote Co., The, Cleveland.
Nukem Prods. Corp., 68 Niagara St., Buffalo, N. Y.

TANK LININGS—Rubber
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Compressed Air, Gas, Oil and Water
Scaife, Wm. B., & Sons Co., Ptgh.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

TANKS—Elevated Wood
Hauser-Stander Tank Co., The, Cincinnati, Ohio.

TANKS—Iron and Steel
Scaife, Wm. B., & Sons Co., Ptgh.

TANKS—Lead Lined
Hauser-Stander Tank Co., The, Cincinnati, Ohio.

TANKS—Pickling
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Atlas Mineral Prods. Co. of Pa., The, Mertztown, Pa.
Cleveland (Ohio) Quarries Co., The.
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

TANKS—Rubber Lined
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Welded
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Scaife, Wm. B., & Sons Co., Pittsburgh.

TANTALUM CARBIDE
Vanadium-Alloys Steel Co., Vascoloy-Ramet Div., North Chicago, Ill.

TAPPING MACHINES
Baker Bros., Inc., Toledo, Ohio.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit.
National Automatic Tool Co., Richmond, Ind.

TAPS—Collapsing
Landis Mach. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.
National Acme Co., The, Cleveland.

TAPS AND DIES
Greenfield (Mass.) Tap & Die Corp.
Landis Mch. Co., Inc., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

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Screw Machine Products Corp., Prov., R. I.

TERNE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

TESTING MACHINES—Materials
Baldwin-Southwark Corp., Southwark Div., Philadelphia.

THERMOMETERS—Recording
Bristol Co., The, Waterbury, Conn.
Brown Instrument Co., Philadelphia.

THREAD CUTTING TOOLS—See Dies Taps

THREAD ROLLING MACHINES
Manville, E. J., Mch. Co., Waterbury, Ct.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.

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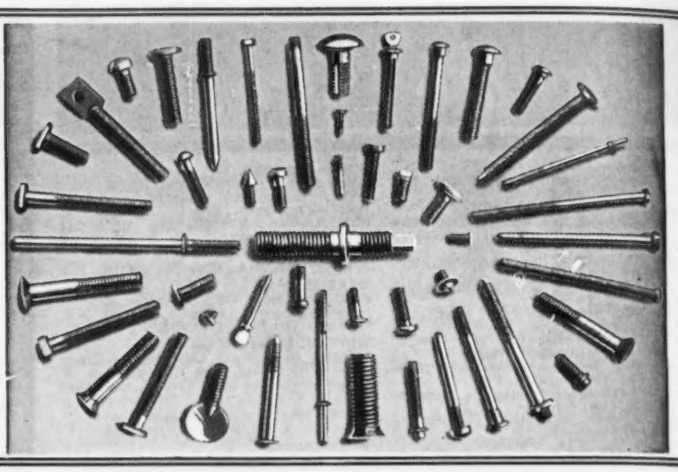

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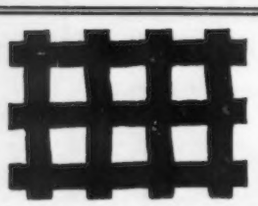

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United Engr. & Fdry. Co. Under Coiling Type. Capacity sheets 48" wide from gauge .020 to .100. Equipped with tail kicking device and coil ejector. Handles coil 24" dia. Driven by 20 H.P., 250 volt, G.E., D.C., variable speed motor 500 to 1500 R.P.M.
Blake & Johnson Sheet Strip Coiler, Motor Driven. Will handle sheets No. 10 gauge up to 24" wide

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Link Belt Two Yard Steel Gantry Traveling Crane 100' Span, 45' Lift, Four Motors, 220 volt, 3 phase, 60 cycle

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10 ton Niles 50' Span, Motors 220 volt, 3 phase, 25 cycle

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100,000 lb. Standard, Motor Driven. 24' Effective Draw, 21" Tube or Rod Extension, Triple Spur Gear Reduction Drive. Total length of machine 60'
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72"x60"x18' Detrick & Harvey, Two Heads on Cross Rail, One Side Head. Motor Driven

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1—38"x44"x20' Ingersoll Slab
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1—No. 1½ Milwaukee
3—No. 3 Cincinnati
3—No. 3-B Milwaukee
1—No. 4 Cincinnati
1—No. 5 Brown & Sharpe
6—No. 6 Becker

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1—24"x24"x12' Gray
1—26" Lynd-Farquhar Crank
1—30"x30"x6' Cincinnati
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1—30"x30"x18' Cincinnati
1—36"x36"x8' Cincinnati
1—36"x36"x12' Gray
1—36"x36"x14'—24' Cleve. O.S.
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1—36"x36"x24' Gray
1—42"x42"x30' N-B-P. Rev. M.D.
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1—48"x48"x12' Cleve. Open Side
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12—10"x36" Norton, Belt & M.D.
8—10"x50" Norton, Belt & M.D.
3—10"x52" Landis
5—10"x72" Norton, Belt & M.D.
3—10"x96" Norton, Belt & M.D.
1—12"x36" Landis

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1—No. 13 B. & S. Cutter & Tool
1—No. 1½—10"x30" Landis
1—No. 2, 10"x25" Univ. (Bath)
1—No. 2½, 10"x36" Univ. (Bath)
1—No. 4—12"x66" Landis

GRINDERS
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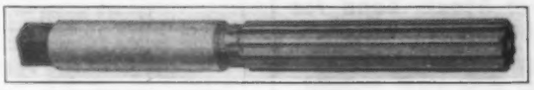

Diameter In.	List Price	OUR PRICE	Length of Flute In.	Length Overall In.
1/8	$1.00	$ .40	1 1/2	3
9/64	1.20	.48	1 5/8	3 1/4
5/32	1.20	.48	1 5/8	3 1/4
11/64	1.20	.48	1 3/4	3 1/2
3/16	1.20	.48	1 3/4	3 1/2
13/64	1.40	.56	1 7/8	3 3/4
7/32	1.40	.56	1 7/8	3 3/4
15/64	1.40	.56	2	4
1/4	1.40	.56	2	4
17/64	1.50	.60	2 1/8	4 1/4
9/32	1.50	.60	2 1/8	4 1/4
19/64	1.50	.60	2 1/4	4 1/2
5/16	1.50	.60	2 1/4	4 1/2
21/64	1.60	.64	2 3/8	4 3/4
11/32	1.60	.64	2 3/8	4 3/4
23/64	1.60	.64	2 1/2	5
3/8	1.60	.64	2 1/2	5
25/64	1.75	.70	2 5/8	5 1/4
13/32	1.75	.70	2 5/8	5 1/4
27/64	1.75	.70	2 3/4	5 1/2
7/16	1.75	.70	2 3/4	5 1/2
29/64	1.90	.76	2 7/8	5 3/4
15/32	1.90	$ .76	2 7/8	5 3/4
31/64	1.90	.76	3	6
1/2	1.90	.76	3	6
33/64	2.00	.80	3 1/8	6 1/4
17/32	2.00	.80	3 1/8	6 1/4
35/64	2.00	.80	3 1/4	6 1/2
9/16	2.00	.80	3 1/4	6 1/2
37/64	2.20	.88	3 3/8	6 3/4
19/32	2.20	.88	3 3/8	6 3/4
39/64	2.20	.88	3 1/2	7
5/8	2.20	.88	3 1/2	7
41/64	2.40	.96	3 11/16	7 3/8
21/32	2.40	.96	3 11/16	7 3/8
43/64	2.40	.96	3 7/8	7 3/4
11/16	2.40	.96	3 7/8	7 3/4
45/64	2.60	1.04	4 1/16	8 1/8
23/32	2.60	1.04	4 1/16	8 1/8
47/64	2.60	1.04	4 3/16	8 3/8
3/4	2.60	1.04	4 3/16	8 3/8
25/32	2.80	1.12	4 3/8	8 3/4
13/16	2.80	1.12	4 9/16	9 1/8
27/32	$3.10	$1.24	4 11/16	9 3/8
7/8	3.10	1.24	4 7/8	9 3/4
29/32	3.40	1.36	5	10
15/16	3.40	1.36	5 1/8	10 1/4
31/32	3.70	1.48	5 5/16	10 5/8
1	3.70	1.48	5 7/16	10 7/8
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1 3/16	4.60	1.84	6	12
1 1/4	4.90	1.96	6 1/8	12 1/4
1 5/16	5.20	2.08	6 1/4	12 1/2
1 3/8	5.60	2.24	6 5/16	12 5/8
1 7/16	6.00	2.40	6 7/16	12 7/8
1 1/2	6.40	2.56	6 1/2	13
1 9/16	6.80	2.72	6 1/2	13
1 5/8	7.20	2.88	6 1/2	13
1 11/16	7.60	3.04	6 3/4	13 1/2
1 3/4	8.00	3.20	6 3/4	13 1/2
1 13/16	8.40	3.36	6 3/4	13 1/2
1 7/8	8.80	3.52	7	14
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835 lbs.	5/8x9/16	1,394 lbs.	3/4x1 7/16
2,127 lbs.	5/8x1 9/16	1,192 lbs.	3/4x11/16
2,908 lbs.	5/8x11/16	3,620 lbs.	11/16x2 1/2
2,157 lbs.	5/8x1 11/16	2,524 lbs.	11/16x3/4
870 lbs.	5/8x3/4	4,008 lbs.	11/16x1 3/4
643 lbs.	5/8x13/16	373 lbs.	11/16x1 1/4
2,000 lbs.	5/8x1 5/8	556 lbs.	11/16x11/16
3,500 lbs.	5/8x1 5/8	200 lbs.	1/4x5/32
1,688 lbs.	9/16x1 11/16	6,267 lbs.	1/4x5/8
239 lbs.	9/16x1 1/4	2,685 lbs.	1 1/4x1
10,972 lbs.	13/16x7/8	4,447 lbs.	13/16x7/8
85 lbs.	3/8 Rd.	4,397 lbs.	17/32x1 1/4
13,182 lbs.	9/16 Rd.	804 lbs.	7/8x1 1/2
11,100 lbs.	13/16 Rd.	26 lbs.	7/8x7/8
9,830 lbs.	15/16 Rd.	4,046 lbs.	13/16x1 1/2
91 lbs.	1 11/16 Rd.	3,477 lbs.	17/32x1
50 lbs.	1 1/4 Rd.	2,348 lbs.	3/4x1 7/16
1,577 lbs.	3/4x1 5/8	1,122 lbs.	1x1/2
5,221 lbs.	3/4x13/16	388 lbs.	1" Hex.
1,377 lbs.	3/4x7/8	3,848 lbs.	1/2" Hex.
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WANTED: MECHANICAL SUPERINTENDENT with Engineer's Degree, thoroughly experienced in all phases of mechanical, electrical and steam engineering and general maintenance, with large company operating several factories. Must be aggressive, hard worker, able to handle large volume of detail in connection with maintenance of equipment. State age, education, past experience and earnings, also salary expected. Address Box R-900, care *The Iron Age*, 239 W. 39th St., New York.

WANTED: REPRESENTATIVE to cover territory within radius 60 miles of Newark. To handle complete line of Mill and Factory Supplies, preferably a graduate sales engineer. Age 25-35. Write letter stating qualifications. Address Box R-907, care *The Iron Age*, 239 W. 39th St., New York.

CHIEF DRAFTSMAN for Midwestern Refrigerator Company. Experienced man between 35 and 45 years of age. College or high school education essential. Give outline of training, experience, age, references and wages desired in application. Address Box R-911, care *The Iron Age*, 239 W. 39th St., New York.

METALLURGIST competent to take charge of department in Eastern Tool Steel Mill. Staff covers both research and routine metallurgy. Give details of experience and approx. salary in first letter. Address Box R-908, care *The Iron Age*, 239 W. 39th St., New York.

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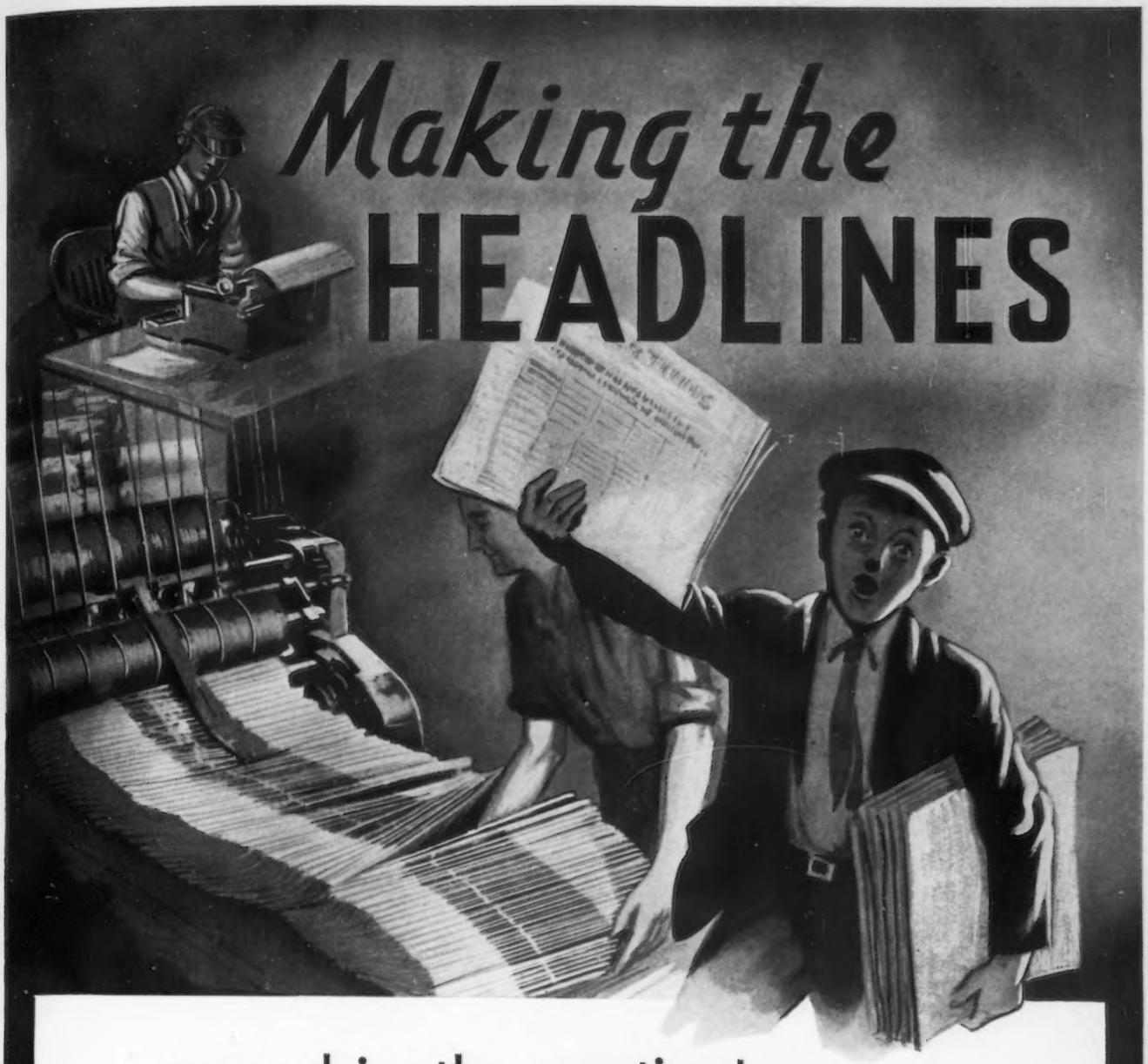

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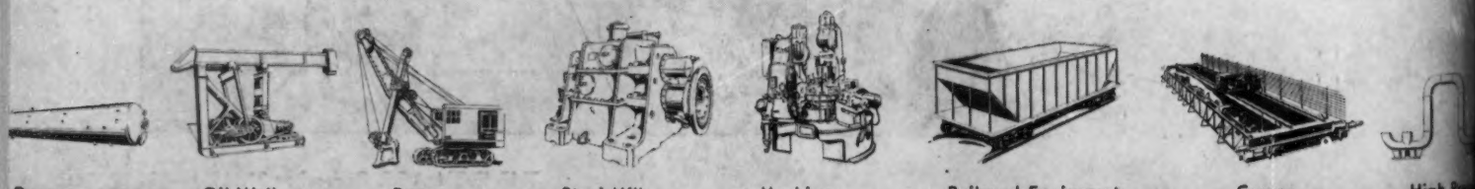

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